



United States
Department of
Agriculture



Natural
Resources
Conservation
Service

In cooperation with
Missouri Agricultural
Experiment Station and
Missouri Department of
Natural Resources

Soil Survey of Laclede County, Missouri



How to Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

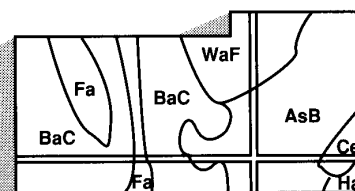
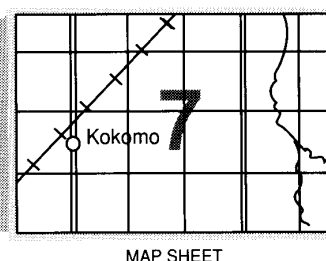
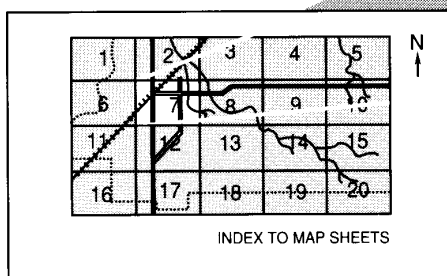
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1993. Soil names and descriptions were approved in 1994. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1994. This survey was made cooperatively by the Natural Resources Conservation Service; the United States Department of Agriculture, Forest Service; and the Missouri Agricultural Experiment Station. The Missouri Department of Natural Resources provided soil scientists to assist with the fieldwork. The survey is part of the technical assistance furnished to the Laclede County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover: A dairy operation in an area of the Wilderness-Viraton association. A waste management lagoon is located in the foreground.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is <http://www.nrcs.usda.gov> (click on "Technical Resources").

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Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

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Soil Survey of Laclede County, Missouri

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Fieldwork by Wally Miller, Michael J. Moore, Glen Spencer, and Gary Sturdevant, Missouri Department of Natural Resources; Richard McBee, James C. Remley, and Sidney Vander Veen, Natural Resources Conservation Service; and George Simmons, Laclede County Soil and Water Conservation District

Significant contributions by Patricia Kowalewycz, United States Forest Service; and Joyce Johnson, Laclede County Soil and Water Conservation District

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the Missouri Agricultural Experiment Station and the Missouri Department of Natural Resources

LACLEDE COUNTY is in the south-central part of Missouri (fig.1). It is bordered on the west by Dallas County, on the southwest by Webster County, on the south by Wright County, on the southeast by Texas County, on the northeast by Pulaski County, and on the north by Camden County. The county has an area of 491,629 acres, or about 768 square miles. Lebanon, the largest town, is the county seat. In 1990, the population of the county was 26,300.

Agriculture is an important enterprise in the county. Beef and dairy cattle are the most numerous kinds of livestock. Grass for pasture and hay is the main crop (fig. 2).

This survey updates the survey of Laclede County published in 1912 (Long and others, 1912). It provides additional and updated information and has larger maps, which show the soils in more detail.

General Nature of the County

This section provides general information about Laclede County. It describes climate, history and development, and relief and drainage.

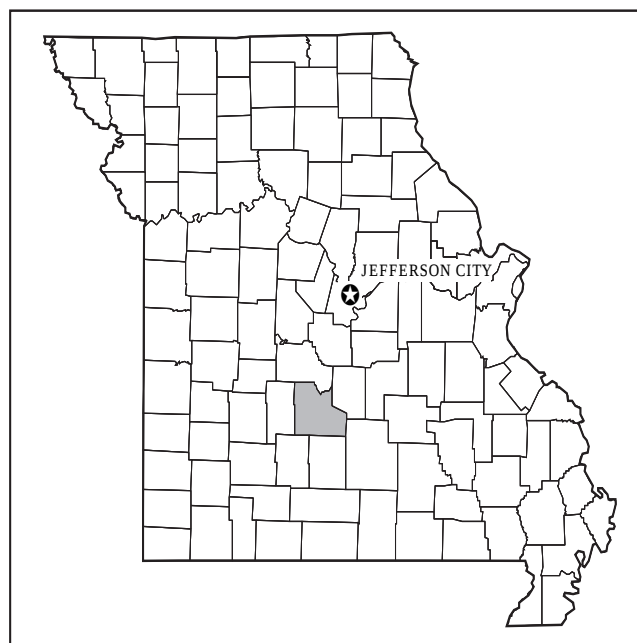


Figure 1.—Location of Laclede County in Missouri.



Figure 2.—Cool-season grasses growing in an area of Viraton silt loam, 1 to 3 percent slopes, for use as pasture and hay.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Lebanon in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 34 degrees F and the average daily minimum temperature is 24 degrees. The lowest temperature on record, which occurred at Lebanon on January 12, 1918, is -21 degrees. In summer, the average temperature is 76 degrees and the average daily maximum temperature is 88 degrees. The highest recorded temperature, which occurred at Lebanon on July 14, 1954, is 113 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly

accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 41.38 inches. Of this, 23.51 inches, or 57 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 12.49 inches. The heaviest 1-day rainfall during the period of record was 5.85 inches at Lebanon on June 9, 1928. Thunderstorms occur on about 56 days each year, and most occur in June.

The average seasonal snowfall is 14.2 inches. The greatest snow depth at any one time during the period of record was 17 inches. On an average of 5 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 58 percent. Humidity is higher at night, and the average at dawn is about 82 percent. The sun shines

69 percent of the time possible in summer and 51 percent in winter. The prevailing wind is from the south-southeast. Average windspeed is highest, 13 miles per hour, in March.

History and Development

Wally Miller, soil scientist, Missouri Department of Natural Resources, helped prepare this section.

The first people to live in the area now known as Laclede County were Native Americans of various tribes, the Osage being the most noteworthy. The first settlers were the Jesse Ballew family. In 1820, Ballew established his home on the Gasconade River near the area now known as the Hazelgreen community.

Laclede County's first legal survey was made between 1835 and 1840. The county was officially organized on February 24, 1849, with land coming from Camden, Pulaski, and Wright Counties. Two local families donated a combined total of 50 acres for use as a county seat. That same year marked the opening of the county's first post office at Oakland.

Schools were first established in the county in 1851, and the first newspaper was published in the county in 1866. In 1867, the county seat was incorporated as a city and named Lebanon in honor of the Rev. Benjamin Hooker, "a gentleman who held a place of great respect in the county, begged to have the county seat named after his old home town, Lebanon, Tennessee. His request was granted."

The Civil War took its toll on Laclede County in much the same way as it did across the rest of southern Missouri. No major skirmishes were fought in the county, but bushwhacking and murders were common enough to totally disrupt progress and life in general.

In 1869, the St. Louis and San Francisco Railroad was built along the Lebanon Plateau, bisecting the county from northeast to southwest. With the end of the war and the advent of the railroad, agricultural production in the county progressed at an even pace.

Farming had begun in the county with early settlers tilling the river bottoms and stream valleys. These settlers used massive amounts of fire to remove forests and undergrowth, and in this manner created improved range conditions on upland areas. As more people moved into the county, the uplands were occupied, and burning gradually ceased. The range reverted to timber, livestock grazing fell from favor, and tillable land was put into grain and hay crops.

The census of 1880 showed total improved acreage in Laclede County stood at 63,498 acres, of which 22,793 acres was used for corn, 15,132 acres was

used for wheat, 5,225 acres was used for oats, and 3,759 acres was used for hay. The balance of the acreage was used for barley, buckwheat, orchards, and pasture.

In 1910, livestock numbers in the county were reported as follows: cattle, 22,928; horses, 8,787; mules, 2,287; hogs, 27,601; and sheep, 26,616.

In comparison, the Missouri Department of Agriculture reported that 450 acres was harvested for corn in Laclede County in 1991, 400 acres was harvested for wheat in 1990, and 56,400 acres was harvested for hay in 1991. In 1992, the county had about 77,700 head of cattle (28,300 beef cows and 12,000 dairy cows) and 5,700 hogs.

By 1889, Laclede County had a population of 11,524, and the population grew steadily until leveling off in 1940 at 18,718. Between 1940 and 1970, the population remained stable, growing only slightly to 19,944. Since that time, the number of inhabitants has grown steadily, and the population stood at 26,300 in 1990.

In 1926, the Missouri Department of Transportation decided to locate U.S. Highway 66 through Laclede County. The addition of a paved road bisecting the county greatly improved the movement of agricultural products to market. With the addition of Missouri Highways 5 and 32, access to the county seat and railroad improved greatly. In the 1950's, Interstate Highway 44 was built, allowing improved transportation for agriculture, businesses, and industries that thrive today.

Relief and Drainage

Wally Miller, soil scientist, Missouri Department of Natural Resources, helped prepare this section.

Laclede County's surface features are variable and diverse. The county is part of the Ozark Highland Area. The elevation ranges from a high of 1,461 feet approximately 2 miles south of Phillipsburg in the southwest quarter of the county to a low of 745 feet along the Laclede-Camden county line in Mash Hollow on Woolsey Creek, a tributary of the Niangua River.

The county is bisected roughly from southwest to northeast by a broad flat ridge system known as the Lebanon Plateau. This plateau area is level to undulating. Weathering has dissected much of the original level country, giving rise to the associated rolling areas.

This Lebanon Plateau occupies the divides or interstream areas of the county, the largest being the area between the Niangua River and the Osage Fork of the Gasconade River. This area includes the relatively

level lands in the vicinity of Lebanon, Phillipsburg, and Conway. Smaller areas of the plateau occur in the vicinity of Morgan, where it forms the divide between the Brush Creek and Panther Creek watersheds and the Brush Creek and Osage Fork watersheds. A remnant of the plateau can also be found between the Osage Fork and the Gasconade River.

In the northwestern part of the county, the streams have cut deep and narrow valleys. Hills rise as high as 100 to 200 feet above the valley floor and spread into flat-topped ridges varying from approximately one-fourth to one-half mile in width.

The eastern part of the county is dominated by steeply dissected areas. The streams, or tributaries of the rivers, run nearly at right angles to the main watercourses and have cut this portion of the county into a series of long, narrow ridges that have in turn been dissected by smaller drainages forming secondary ridges.

Primary surface drainages in the southeast half of the county are the Osage Fork of the Gasconade River and the Gasconade River itself. Surface drainages in the northwest half of the county are tributary creeks that feed the Niangua River and Dry Auglaize Creek, a tributary of the Osage River. The Gasconade, Niangua, and Osage Rivers all flow north into the Missouri River.

Due to the unique karst geologic structure of the county, subsurface drainage has a major impact on water quality. Sinkholes and losing streams feed underground aquifers, springs, surface streams, and rivers. Dye tracing has shown that water entering Brush Creek, a surface tributary to the Osage Fork located south of the Lebanon Plateau, emerges at Bennett Spring State Park in the Niangua River basin, north of the Lebanon Plateau in the northwest part of the county, which is a straight line distance of approximately 14 miles.

Dye tracing of runoff entering Goodwin Hollow Creek, a losing stream that flows into the Osage River to the north, also emerges at Bennett Spring, some 9 miles to the west in the Niangua River basin.

This information shows that contamination of sinkholes and surface streams leads directly to contamination of underground aquifers.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of

crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. Soil

scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however,

the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes.

Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from

place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

1. Cedargap-Dapue-Racket Association

Extent of the association:

14 percent of the survey area

Composition:

Cedargap and similar soils—37 percent

Dapue and similar soils—14 percent

Racket and similar soils—14 percent

Minor soils—35 percent (Bearthicket, Britwater, Hartville, Kaintuck, Moniteau, Pomme, Tanglenook, Winnipeg)

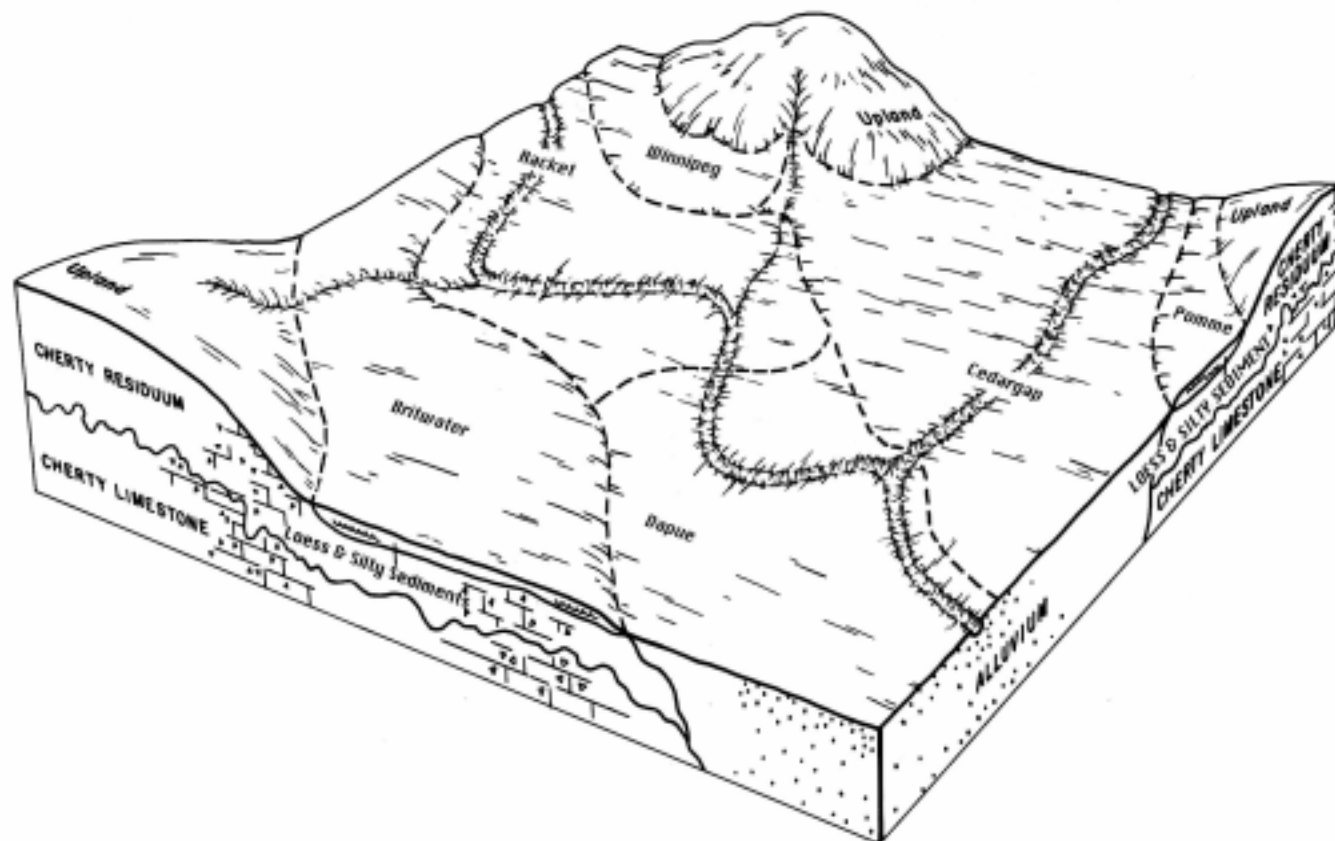


Figure 3.—Typical pattern of soils and parent material in the Cedargap-Dapue-Racket association.

Landscape (fig. 3):

- Cedargap—flood plains of small streams
- Dapue—flood plains of major streams
- Racket—flood plains of major streams and small streams

Parent materials:

Alluvium

Slope range:

0 to 3 percent

Slope configuration:

Linear and simple

2. Clarksville-Poynor Association**Extent of the association:**

21 percent of the survey area

Composition:

- Clarksville and similar soils—76 percent
- Poynor and similar soils—10 percent
- Minor soils—14 percent (Moko, Viraton, and Wilderness)

Landscape (fig. 4):

- Clarksville—backslopes, shoulder slopes, and narrow ridgetops
- Poynor—narrow ridgetops, shoulder slopes, and backslopes

Parent materials:

Gravelly slope alluvium and residuum

Slope range:

1 to 35 percent

Slope configuration:

Convex and complex

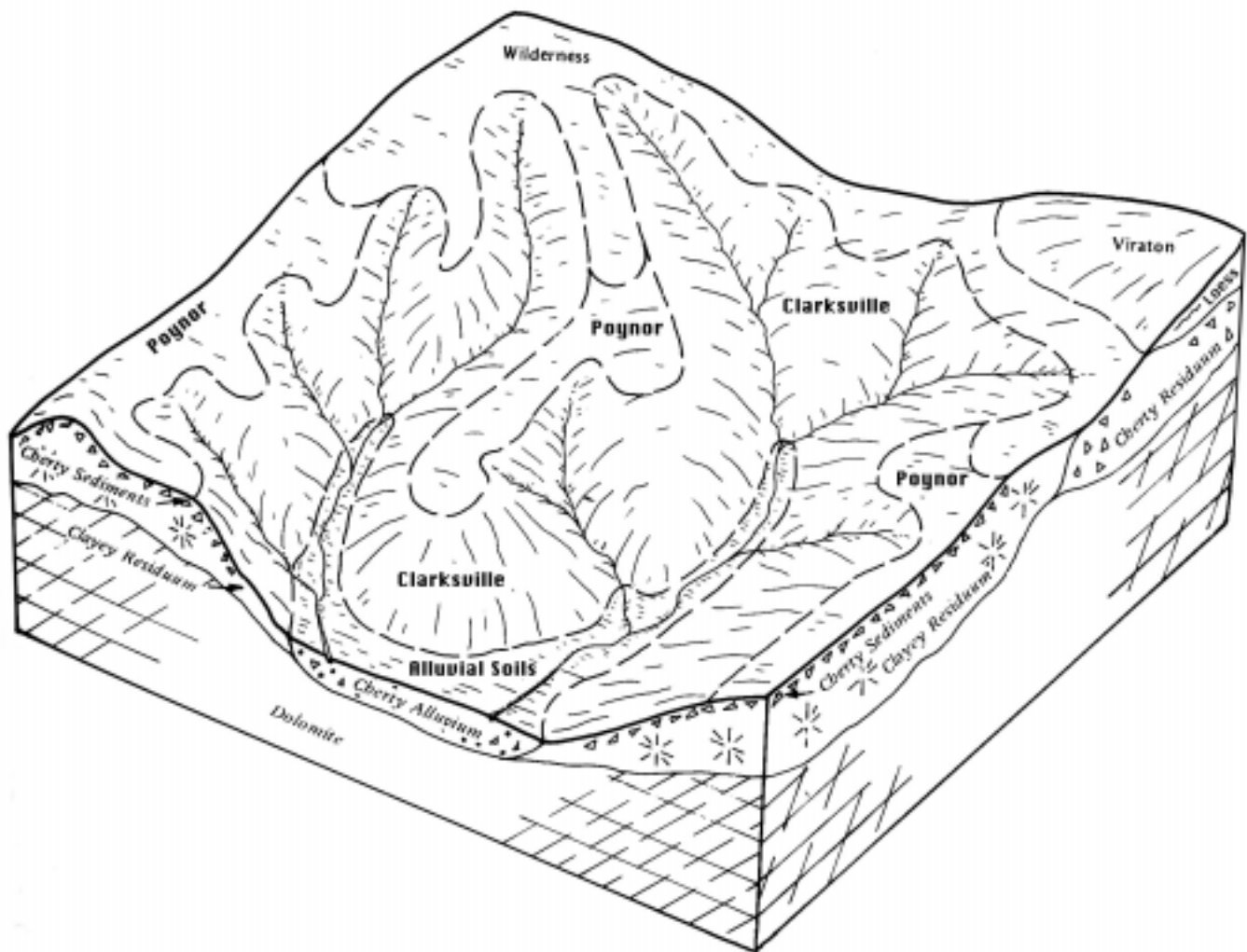


Figure 4.—Typical pattern of soils and parent material in the Clarksville-Poynor association.

3. Gatewood-Ocie Association

Extent of the association:

19 percent of the survey area

Composition:

Gatewood and similar soils—45 percent

Ocie and similar soils—35 percent

Minor soils—20 percent (Blueeye, Gasconade,
Mano, Rock outcrop, Viraton, and Wilderness)

Landscape (fig. 5):

Gatewood—narrow ridgetops, shoulder slopes, and
backslopes

Ocie—narrow ridgetops, shoulder slopes, and
backslopes

Parent materials:

Gravelly slope alluvium and residuum

Slope range:

3 to 35 percent

Slope configuration:

Convex and complex

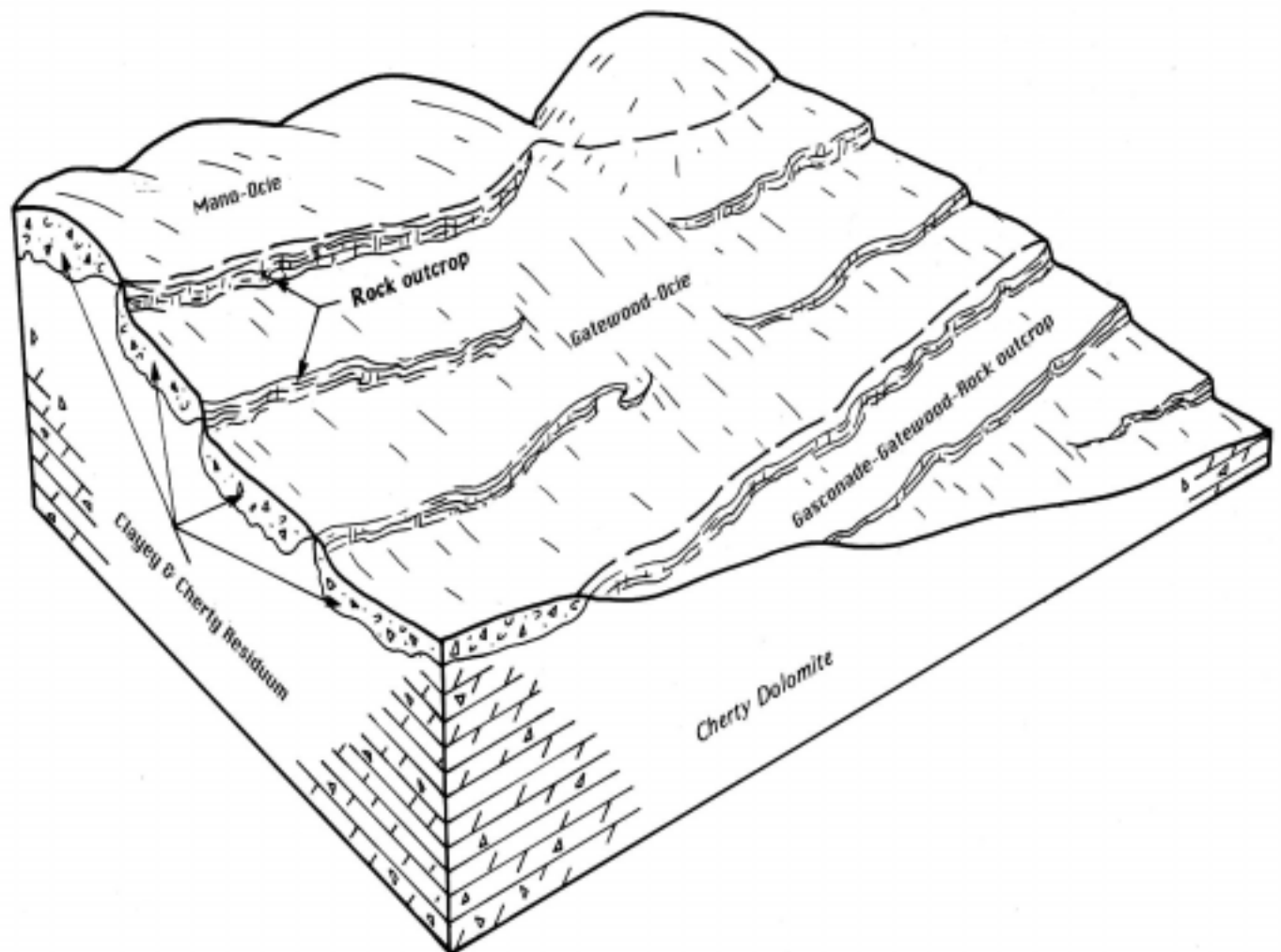


Figure 5.—Typical pattern of soils and parent material in the Gatewood-Ocie association.

4. Plato-Creldon Association

Extent of the association:

1 percent of the survey area

Composition:

Plato and similar soils—68 percent

Creldon and similar soils—28 percent

Minor soils—4 percent (Lowassie and Viraton)

Landscape (fig. 6):

Plato—broad ridgetops

Creldon—broad ridgetops

Parent materials:

Loess, gravelly slope alluvium, and residuum

Slope range:

1 to 3 percent

Slope configuration:

Convex and complex

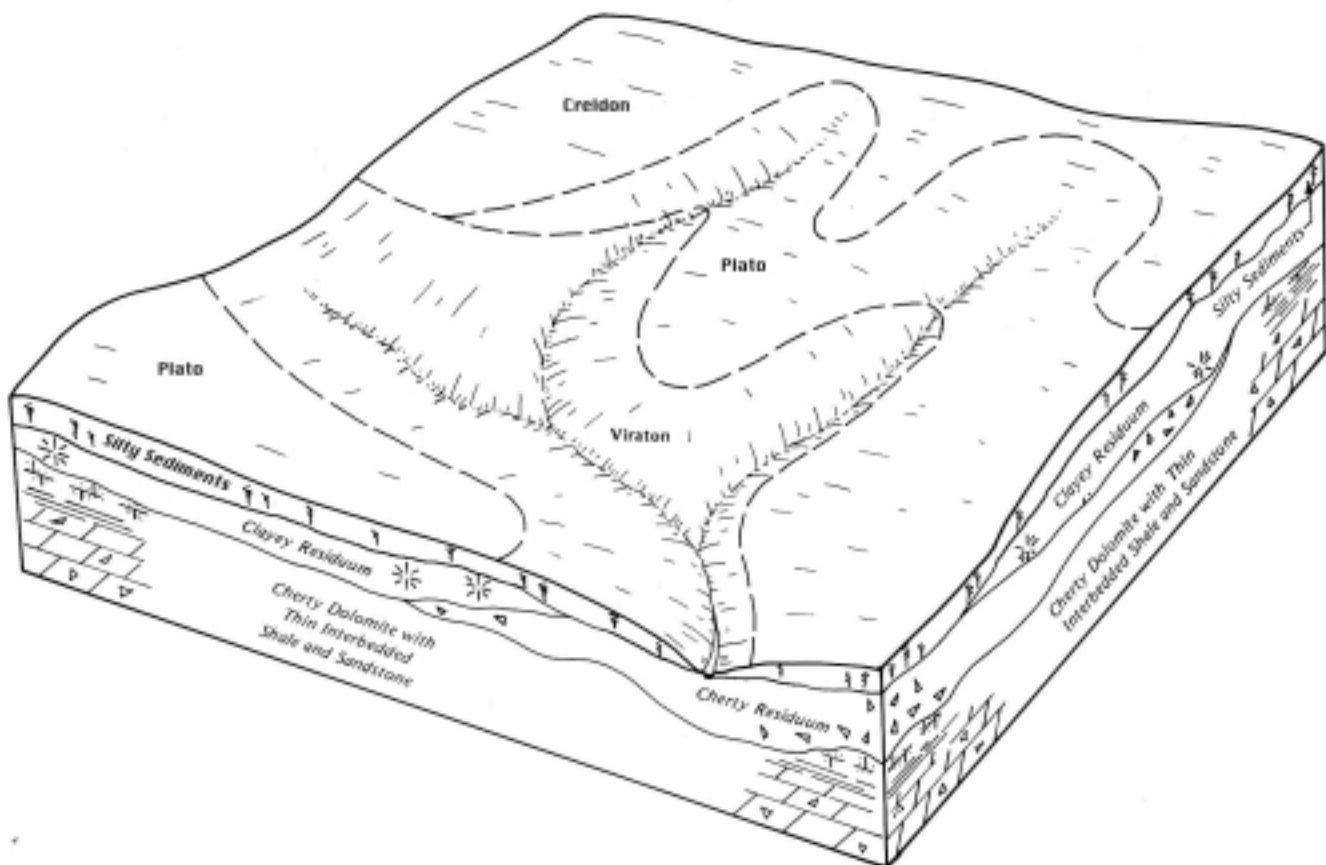


Figure 6.—Typical pattern of soils and parent material in the Plato-Creldon association.

5. Poynor-Tonti Association

Extent of the association:

6 percent of the survey area

Composition:

Poynor and similar soils—67 percent

Tonti and similar soils—18 percent

Minor soils—15 percent (Bendavis, Viraton, and Wilderness)

Landscape (fig. 7):

Poynor—narrow ridgetops, shoulder slopes, and backslopes

Tonti—broad ridgetops and shoulder slopes, dominantly in the eastern portion of the county

Parent materials:

Loess, slope alluvium, and residuum

Slope range:

1 to 35 percent

Slope configuration:

Convex and complex

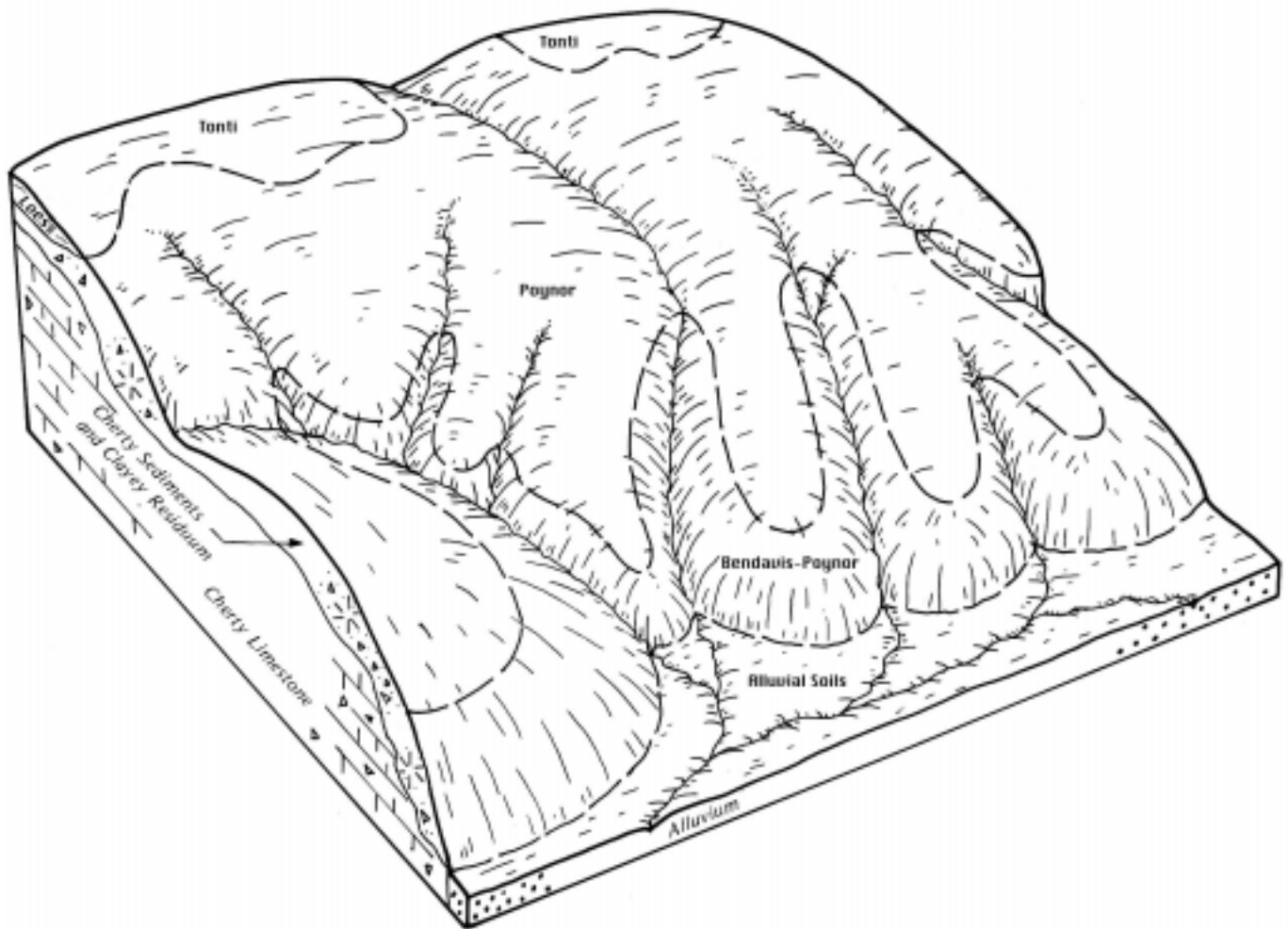


Figure 7.—Typical pattern of soils and parent material in the Poynor-Tonti association.

6. Rueter-Bardley-Clarksville Association

Extent of the association:

5 percent of the survey area

Composition:

Rueter and similar soils—42 percent

Bardley and similar soils—35 percent

Clarksville and similar soils—13 percent

Minor soils—10 percent (Alred, Gasconade, Rock outcrop, and Wilderness)

Landscape (fig. 8):

Rueter—backslopes

Bardley—narrow ridgetops, shoulder slopes, and backslopes

Clarksville—narrow ridgetops, shoulder slopes, and backslopes

Parent materials:

Gravelly slope alluvium and residuum

Slope range:

8 to 60 percent

Slope configuration:

Convex and complex

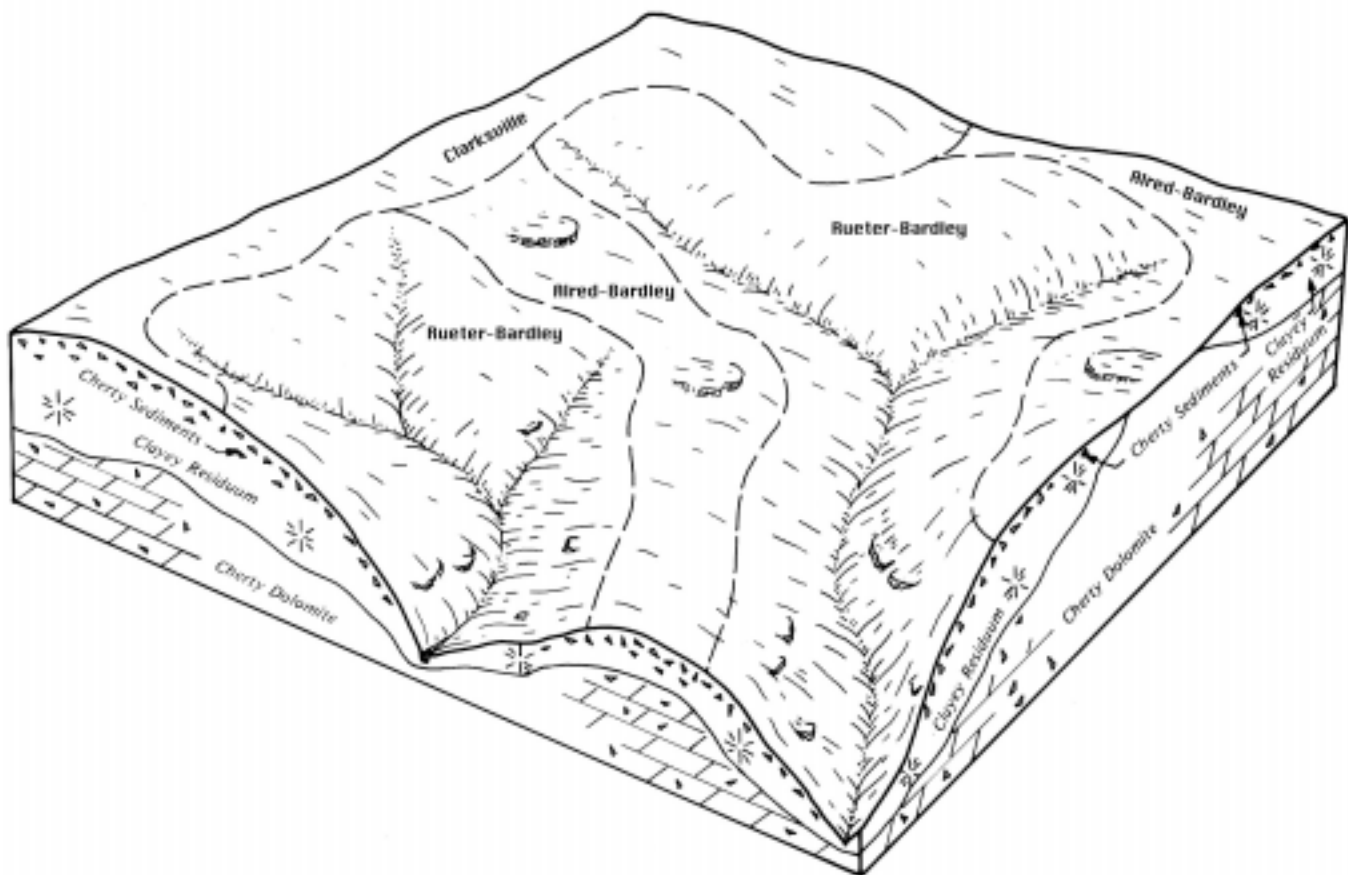


Figure 8.—Typical pattern of soils and parent material in the Rueter-Bardley-Clarksville association.

7. Wilderness-Viraton Association

Extent of the association:

34 percent of the survey area

Composition:

Wilderness and similar soils—55 percent

Viraton and similar soils—35 percent

Minor soils—10 percent (Clarksville, Lowassie, Plato, and Poynor)

Landscape (fig. 9):

Wilderness—narrow ridgetops and shoulder slopes

Viraton—broad ridgetops and shoulder slopes

Parent materials:

Loess, gravelly slope alluvium, and residuum

Slope range:

1 to 8 percent

Slope configuration:

Convex and complex

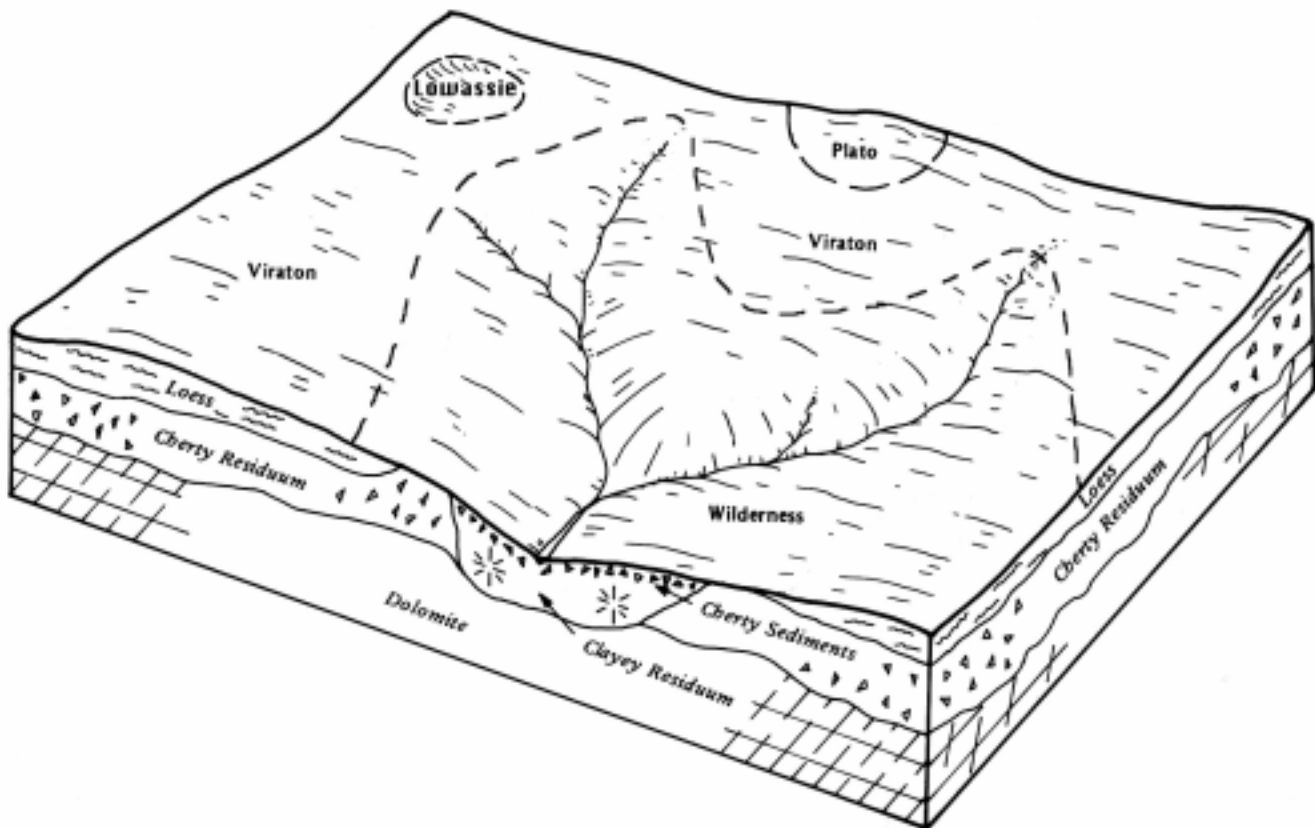


Figure 9.—Typical pattern of soils and parent material in the Wilderness-Viraton association.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under the heading "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in Composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Wilderness gravelly silt loam, 3 to 8 percent slopes, is a phase of the Wilderness series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Gatewood-Ocie complex, 3 to 8 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils.

Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarries, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

The descriptions, names, and delineations of the soils identified on the detailed soil maps of this survey do not fully agree with those in the surveys of adjacent counties published at a different date. Differences are the result of additional soil data, variations in the intensity of mapping, and correlation decisions that reflect local conditions. In some areas, combining small acreages of similar soils that respond to use and management in much the same way was more practical than mapping these soils separately.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

66000—Moniteau silt loam, 0 to 2 percent slopes, occasionally flooded

Setting

Landform: Flood plain

Parent material: Silty alluvium

Composition

Moniteau and similar soils—90 percent

Minor components—10 percent

Britwater

Hartville

Tanglenook

Winnipeg

Typical Profile

Ap—0 to 7 inches; silt loam
 E—7 to 14 inches; silt loam
 Btg—14 to 80 inches; silty clay loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Moderately slow (0.2-0.6 inch/hour)
Available water capacity: High (9 to 12 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: Occasional (5 to 50 percent chance in any year)
Water table: 0 to 12 inches

70006—Credon silt loam, 1 to 3 percent slopes**Setting**

Landform: Hill
Position on the landform: Summit
Parent material: Silty sediments over gravelly residuum

Composition

Credon and similar soils—85 percent
 Minor components—15 percent
 Lowassie
 Plato
 Viraton
 Areas without a fragipan
 Eroded areas

Typical Profile

Ap—0 to 10 inches; silt loam
 Bt—10 to 26 inches; silty clay
 2Btx1—26 to 33 inches; silty clay loam
 3Btx2—33 to 41 inches; extremely gravelly silty clay loam
 4Bt—41 to 80 inches; very gravelly clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Very slow (<0.06 inch/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 18 to 36 inches

70020—Blueye gravelly silt loam, 3 to 8 percent slopes**Setting**

Landform: Hill
Position on the landform: Summit
Parent material: Gravelly slope alluvium over clayey residuum

Composition

Blueye and similar soils—90 percent
 Minor components—10 percent
 Gasconade
 Gatewood
 Ocie
 Rock outcrop
 Wilderness

Typical Profile

Ap—0 to 9 inches; gravelly silt loam
 A—9 to 14 inches; gravelly silt loam
 2Bt—14 to 39 inches; gravelly clay
 3R—39 inches; unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Moderately deep (20 to 40 inches)
Drainage class: Moderately well drained
Permeability: Slow (0.06-0.2 inch/hour)
Available water capacity: Very low (0 to 3 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: None

70021—Moko very gravelly loam, 50 to 80 percent slopes**Setting**

Landform: Hill
Parent material: Gravelly colluvium

Composition

Moko and similar soils—75 percent
 Minor components—25 percent
 Alred
 Clarksville
 Gatewood
 Ocie
 Rock outcrop

Typical Profile

A1—0 to 2 inches; very gravelly loam
 A2—2 to 10 inches; very gravelly loam
 2R—10 inches; unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Very shallow and shallow (4 to 20 inches)

Drainage class: Somewhat excessively drained

Permeability: Moderate (0.6 inch-2.0 inches/hour)

Available water capacity: Very low (0 to 3 inches)

Organic matter content: High (4 to 8 percent)

Shrink-swell potential: Low (0 to 3 percent)

Flooding: None

Water table: None

70022—Tonti silt loam, 3 to 8 percent slopes**Setting**

Landform: Hill

Position on the landform: Summit

Parent material: Silty loess over gravelly slope alluvium over clayey residuum

Composition

Tonti and similar soils—85 percent

Minor components—15 percent

Plato

Wilderness

Areas with bedrock below the fragipan

Areas without a fragipan

Typical Profile

A—0 to 8 inches; silt loam

Bt—8 to 20 inches; gravelly silty clay loam

2Btx—20 to 34 inches; extremely gravelly silt loam

3Bt—34 to 80 inches; very gravelly clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)

Drainage class: Moderately well drained

Permeability: Very slow (<0.06 inch/hour)

Available water capacity: Very low (0 to 3 inches)

Organic matter content: Moderate (2 to 4 percent)

Shrink-swell potential: Moderate (3 to 6 percent)

Flooding: None

Water table: 18 to 30 inches

71250—Britwater silt loam, 1 to 3 percent slopes, rarely flooded**Setting**

Landform: Stream terrace

Parent material: Loamy alluvium

Composition

Britwater and similar soils—80 percent

Minor components—20 percent

Bearthicket

Hartville

Viraton

Typical Profile

Ap—0 to 6 inches; silt loam

Bt1—6 to 22 inches; silty clay loam

2Bt2—22 to 80 inches; very gravelly clay loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 inch-2.0 inches/hour)

Available water capacity: Moderate (6 to 9 inches)

Organic matter content: Moderately low (1 to 2 percent)

Shrink-swell potential: Moderate (3 to 6 percent)

Flooding: Rare (1 to 5 percent chance in any year)

Water table: None

71251—Britwater silt loam, 3 to 8 percent slopes, very rarely flooded**Setting**

Landform: Stream terrace and footslope

Parent material: Loamy alluvium and colluvium

Composition

Britwater and similar soils—85 percent

Minor components—15 percent

Hartville

Poynor

Viraton

Typical Profile

Ap—0 to 6 inches; silt loam

Bt1—6 to 22 inches; silty clay loam

2Bt2—22 to 80 inches; very gravelly clay loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: Very rare (less than a 1 percent chance in any year)
Water table: None

73000—Pomme silt loam, 3 to 8 percent slopes

Setting

Landform: Strath terrace
Parent material: Loamy colluvium

Composition

Pomme and similar soils—80 percent
 Minor components—20 percent
 Hartville
 Poynor
 Viraton
 Winnipeg
 Eroded areas

Typical Profile

Ap—0 to 7 inches; silt loam
 Bt1—7 to 19 inches; silty clay loam
 2Bt2—19 to 57 inches; very gravelly silty clay loam
 3Bt3—57 to 86 inches; extremely gravelly clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: None

73007—Plato silt loam, 1 to 3 percent slopes

Setting

Landform: Hill
Position on the landform: Summit
Parent material: Silty loess over gravelly slope alluvium over clayey residuum

Composition

Plato and similar soils—80 percent
 Minor components—20 percent
 Lowassie
 Viraton

Typical Profile

Ap—0 to 6 inches; silt loam
 Bt—6 to 29 inches; silty clay loam
 2Btx—29 to 46 inches; extremely gravelly silt loam
 3Bt—46 to 80 inches; very gravelly clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Permeability: Very slow (<0.06 inch/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 12 to 24 inches

73010—Wilderness gravelly silt loam, 3 to 8 percent slopes

Setting

Landform: Hill
Position on the landform: Summit
Parent material: Gravelly slope alluvium over clayey residuum

Composition

Wilderness and similar soils—80 percent
 Minor components—20 percent
 Cedargap
 Poynor
 Viraton

Typical Profile

A—0 to 6 inches; gravelly silt loam
 Bt—6 to 17 inches; very gravelly silty clay loam
 2Btx—17 to 38 inches; very gravelly silty clay loam
 3Bt—38 to 80 inches; very gravelly clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Very slow (<0.06 inch/hour)
Available water capacity: Very low (0 to 3 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Low (0 to 3 percent)
Flooding: None
Water table: 15 to 24 inches

73013—Lowassie silt loam, 0 to 3 percent slopes, frequently ponded**Setting***Landform:* Sinkhole*Parent material:* Silty loess and silty and clayey slope alluvium**Composition**

Lowassie and similar soils—90 percent

Minor components—10 percent

Plato

Splitlimb

Typical Profile

Ap—0 to 10 inches; silt loam

BE—10 to 18 inches; silt loam

Btg1—18 to 36 inches; silty clay

2Btg2—36 to 80 inches; silt loam or silty clay loam

Soil Properties and Qualities*Depth to bedrock:* Very deep (more than 60 inches)*Drainage class:* Poorly drained*Permeability:* Slow (0.06-0.2 inch/hour)*Available water capacity:* Moderate (6 to 9 inches)*Organic matter content:* Moderately low (1 to 2 percent)*Shrink-swell potential:* High (6 to 9 percent)*Flooding:* None*Water table:* At surface**73014—Clarksville very gravelly silt loam, 8 to 15 percent slopes****Setting***Landform:* Hill*Position on the landform:* Backslope, shoulder, and summit*Parent material:* Gravelly slope alluvium over gravelly residuum**Composition**

Clarksville and similar soils—90 percent

Minor components—10 percent

Poynor

Tonti

Wilderness

Typical Profile

A—0 to 3 inches; very gravelly silt loam

E—3 to 13 inches; extremely gravelly silt loam

Bt1—13 to 47 inches; very gravelly silty clay loam

2Bt2—47 to 80 inches; very gravelly silty clay

Soil Properties and Qualities*Depth to bedrock:* Very deep (more than 60 inches)*Drainage class:* Somewhat excessively drained*Permeability:* Moderate (0.6 inch-2.0 inches/hour)*Available water capacity:* Low (3 to 6 inches)*Organic matter content:* Moderately low (1 to 2 percent)*Shrink-swell potential:* High (6 to 9 percent)*Flooding:* None*Water table:* None**73015—Viraton silt loam, 1 to 3 percent slopes (fig. 10)****Setting***Landform:* Hill*Position on the landform:* Summit*Parent material:* Silty loess over gravelly slope alluvium over clayey residuum**Composition**

Viraton and similar soils—85 percent

Minor components—15 percent

Plato

Wilderness

Eroded areas

Typical Profile

Ap—0 to 6 inches; silt loam

Bt—6 to 21 inches; silty clay loam

2Btx—21 to 33 inches; very gravelly silt loam

3Bt—33 to 60 inches; very gravelly clay

Soil Properties and Qualities*Depth to bedrock:* Very deep (more than 60 inches)*Drainage class:* Moderately well drained*Permeability:* Very slow (<0.06 inch/hour)*Available water capacity:* Very low (0 to 3 inches)*Organic matter content:* Moderately low (1 to 2 percent)*Shrink-swell potential:* Moderate (3 to 6 percent)*Flooding:* None*Water table:* 15 to 30 inches**73016—Viraton silt loam, 3 to 8 percent slopes****Setting***Landform:* Hill*Position on the landform:* Summit*Parent material:* Silty loess over gravelly slope alluvium over clayey residuum



Figure 10.—Hay is an important crop and is produced in areas of Viraton silt loam, 1 to 3 percent slopes.

Composition

Viraton and similar soils—80 percent
 Minor components—20 percent
 Wilderness
 Areas without a pan
 Eroded areas

Typical Profile

Ap—0 to 6 inches; silt loam
 Bt—6 to 21 inches; silty clay loam
 2Btx—21 to 33 inches; very gravelly silt loam
 3Bt—33 to 60 inches; very gravelly clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Very slow (<0.06 inch/hour)
Available water capacity: Very low (0 to 3 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: 15 to 30 inches

**73017—Bendavis-Poynor complex, rocky,
 15 to 50 percent slopes, very stony**
 (fig. 11)

Setting

Landform: Hill
Position on the landform: Backslope
Parent material: Bendavis—gravelly slope alluvium;
 Poynor—gravelly slope alluvium over clayey
 residuum

Composition

Bendavis and similar soils—70 percent
 Poynor and similar soils—20 percent
 Minor components—10 percent
 Clarksville
 Areas with a fragipan
 Rock outcrop
 Surface stones and boulders



Figure 11.—An area of Bendavis-Poynor complex, rocky, 15 to 50 percent slopes, very stony, showing rock outcrop component.

Typical Profile

Bendavis

A—0 to 3 inches; very gravelly silt loam
 BA—3 to 14 inches; very gravelly silt loam
 Bt—14 to 34 inches; very gravelly silt loam
 2R—34 inches; unweathered bedrock

Poynor

A—0 to 4 inches; very gravelly silt loam

E—4 to 10 inches; very gravelly silt loam
 Bt1—10 to 28 inches; very gravelly silt loam
 2Bt2—28 to 80 inches; clay

Soil Properties and Qualities

Depth to bedrock: Bendavis—moderately deep (20 to 40 inches); Poynor—very deep (more than 60 inches)

Drainage class: Bendavis—moderately well drained; Poynor—well drained

Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Bendavis—low (0 to 3 percent);
 Poynor—moderate (3 to 6 percent)
Flooding: None
Water table: None

73018—Clarksville very gravelly silt loam, 15 to 35 percent slopes

Setting

Landform: Hill
Position on the landform: Backslope
Parent material: Gravelly slope alluvium over clayey
 residuum

Composition

Clarksville and similar soils—90 percent
 Minor components—10 percent
 Bendavis
 Cedargap
 Poynor
 Wilderness
 Areas with surface stones

Typical Profile

A—0 to 3 inches; very gravelly silt loam
 E—3 to 13 inches; extremely gravelly silt loam
 Bt1—13 to 47 inches; very gravelly silt loam
 2Bt3—47 to 80 inches; very cobbly clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: None

73019—Poynor very gravelly silt loam, 1 to 8 percent slopes

Setting

Landform: Hill
Position on the landform: Summit
Parent material: Gravelly slope alluvium over clayey
 residuum

Composition

Poynor and similar soils—95 percent
 Minor components—5 percent
 Clarksville
 Tonti
 Wilderness

Typical Profile

A—0 to 4 inches; very gravelly silt loam
 E—4 to 10 inches; very gravelly silt loam
 Bt1—10 to 28 inches; very gravelly silty clay loam
 2Bt2—28 to 80 inches; gravelly clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Low (0.5 to 1 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: None

73020—Poynor very gravelly silt loam, 8 to 15 percent slopes (fig. 12)

Setting

Landform: Hill
Position on the landform: Shoulder
Parent material: Gravelly slope alluvium over clayey
 residuum

Composition

Poynor and similar soils—85 percent
 Minor components—15 percent
 Clarksville
 Mano
 Wilderness
 Very deep clayey soils

Typical Profile

A—0 to 4 inches; very gravelly silt loam
 E—4 to 10 inches; very gravelly silt loam
 Bt1—10 to 28 inches; very gravelly silty clay loam
 2Bt2—28 to 80 inches; clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Low (3 to 6 inches)



Figure 12.—An area of Poynor very gravelly silt loam, 8 to 15 percent slopes, in which clearcut timber management is used to improve stand quality.

Organic matter content: Moderate (2 to 4 percent)

Shrink-swell potential: Moderate (3 to 6 percent)

Flooding: None

Water table: None

Position on the landform: Backslope

Parent material: Gravelly slope alluvium over clayey residuum

Composition

73021—Poynor extremely gravelly silt loam, 15 to 35 percent slopes, stony

Poynor and similar soils—90 percent

Minor components—10 percent

Bendavis

Clarksville

Gatewood

Ocie

Surface stones and boulders

Setting

Landform: Hill

Typical Profile

A—0 to 4 inches; very gravelly silt loam
 E—4 to 10 inches; very gravelly silt loam
 Bt1—10 to 28 inches; very gravelly silty clay loam
 2Bt2—28 to 80 inches; clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: None

73022—Alred-Bardley complex, 8 to 15 percent slopes**Setting**

Landform: Hill
Parent material: Gravelly slope alluvium over clayey residuum

Composition

Alred and similar soils—55 percent
 Bardley and similar soils—35 percent
 Minor components—10 percent
 Gasconade
 Ocie
 Rock outcrop

Typical Profile**Alred**

A—0 to 4 inches; very gravelly silt loam
 Bt1—4 to 27 inches; very gravelly silty clay loam
 2Bt2—27 to 80 inches; clay

Bardley

A—0 to 4 inches; very gravelly silt loam
 E—4 to 8 inches; very gravelly silt loam
 2Bt—8 to 27 inches; clay
 3R—27 inches; unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Alred—very deep (more than 60 inches); Bardley—moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Slow (0.06-0.2 inch/hour)

Available water capacity: Alred—low (3 to 6 inches); Bardley—very low (0 to 3 inches)
Organic matter content: Alred—moderately low (1 to 2 percent); Bardley—low (0.5 to 1 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: None

73023—Mano-Ocie complex, 1 to 8 percent slopes**Setting**

Landform: Hill
Position on the landform: Summit
Parent material: Gravelly slope alluvium over clayey residuum

Composition

Mano and similar soils—65 percent
 Ocie and similar soils—25 percent
 Minor components—10 percent
 Bendavis
 Gatewood
 Rueter
 Viraton
 Wilderness

Typical Profile**Mano**

A—0 to 3 inches; gravelly silt loam
 E—3 to 13 inches; gravelly silt loam
 Bt1—13 to 33 inches; very gravelly silt loam
 2Bt2—33 to 80 inches; clay

Ocie

A—0 to 5 inches; very gravelly silt loam
 E—5 to 11 inches; very gravelly silt loam
 Bt1—11 to 24 inches; very gravelly silty clay loam
 2Bt2—24 to 56 inches; clay
 3R—56 inches; unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Mano—very deep (more than 60 inches); Ocie—deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Slow (0.06-0.2 inch/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 18 to 36 inches

73024—Mano-Ocie complex, 8 to 15 percent slopes, stony

Setting

Landform: Hill

Position on the landform: Shoulder

Parent material: Gravelly slope alluvium over clayey residuum

Composition

Mano and similar soils—55 percent

Ocie and similar soils—35 percent

Minor components—10 percent

Bendavis

Gatewood

Rueter

Very deep soils with less gravel in the upper part

Typical Profile

Mano

A—0 to 3 inches; very gravelly silt loam

E—3 to 13 inches; very gravelly silt loam

Bt1—13 to 33 inches; very gravelly silt loam

2Bt2—33 to 80 inches; clay

Ocie

A—0 to 5 inches; very gravelly silt loam

E—5 to 11 inches; very gravelly silt loam

Bt1—11 to 24 inches; very gravelly silt loam

2Bt2—24 to 56 inches; gravelly clay

3R—56 inches; unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Mano—very deep (more than 60 inches); Ocie—deep (40 to 60 inches)

Drainage class: Moderately well drained

Permeability: Slow (0.06-0.2 inch/hour)

Available water capacity: Moderate (6 to 9 inches)

Organic matter content: Moderate (2 to 4 percent)

Shrink-swell potential: High (6 to 9 percent)

Flooding: None

Water table: 18 to 36 inches

73025—Gatewood-Ocie complex, 3 to 8 percent slopes

Setting

Landform: Hill

Position on the landform: Summit

Parent material: Gravelly slope alluvium over clayey residuum

Composition

Gatewood and similar soils—50 percent

Ocie and similar soils—30 percent

Minor components—20 percent

Gasconade

Mano

Wilderness

Clayey soils with more or less than 35 percent rock fragments

Typical Profile

Gatewood

A—0 to 2 inches; gravelly silt loam

E—2 to 5 inches; very gravelly silt loam

2Bt—5 to 36 inches; clay

3R—36 inches; unweathered bedrock

Ocie

A—0 to 5 inches; very gravelly silt loam

E—5 to 11 inches; very gravelly silt loam

Bt1—11 to 24 inches; very gravelly silt loam

2Bt2—24 to 56 inches; clay

3R—56 inches; unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Gatewood—moderately deep (20 to 40 inches); Ocie—deep (40 to 60 inches)

Drainage class: Moderately well drained

Permeability: Slow (0.06-0.2 inch/hour)

Available water capacity: Gatewood—low (3 to 6 inches); Ocie—moderate (6 to 9 inches)

Organic matter content: Gatewood—moderately low (1 to 2 percent); Ocie—moderate (2 to 4 percent)

Shrink-swell potential: High (6 to 9 percent)

Flooding: None

Water table: 18 to 36 inches

73026—Gatewood-Ocie complex, 8 to 15 percent slopes

Setting

Landform: Hill

Position on the landform: Shoulder and summit

Parent material: Gravelly slope alluvium over clayey residuum

Composition

Gatewood and similar soils—40 percent

Ocie and similar soils—30 percent

Minor components—30 percent

Gasconade

Mano

Clayey soils with more or less than 35 percent
rock fragments

Typical Profile

Gatewood

A—0 to 2 inches; very gravelly silt loam

E—2 to 5 inches; very gravelly silt loam

2Bt—5 to 36 inches; gravelly clay

3R—36 inches; unweathered bedrock

Ocie

A—0 to 5 inches; very gravelly silt loam

E—5 to 11 inches; very gravelly silt loam

Bt1—11 to 24 inches; very gravelly silt loam

2Bt2—24 to 56 inches; clay

3R—56 inches; unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Gatewood—moderately deep (20 to
40 inches); Ocie—deep (40 to 60 inches)

Drainage class: Moderately well drained

Permeability: Slow (0.06-0.2 inch/hour)

Available water capacity: Gatewood—low (3 to 6
inches); Ocie—moderate (6 to 9 inches)

Organic matter content: Moderate (2 to 4 percent)

Shrink-swell potential: High (6 to 9 percent)

Flooding: None

Water table: 18 to 36 inches

73027—Gatewood-Ocie complex, 15 to 35 percent slopes

Setting

Landform: Hill

Position on the landform: Backslope

Parent material: Gravelly slope alluvium over clayey
residuum

Composition

Gatewood and similar soils—45 percent

Ocie and similar soils—35 percent

Minor components—20 percent

Gasconade

Mano

Rock outcrop

Typical Profile

Gatewood

A—0 to 2 inches; very gravelly silt loam

E—2 to 5 inches; very gravelly silt loam

2Bt—5 to 36 inches; clay

3R—36 inches; unweathered bedrock

Ocie

A—0 to 5 inches; very gravelly silt loam

E—5 to 11 inches; very gravelly silt loam

Bt1—11 to 24 inches; very gravelly silt loam

2Bt2—24 to 56 inches; gravelly clay

3R—56 inches; unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Gatewood—moderately deep (20 to
40 inches); Ocie—deep (40 to 60 inches)

Drainage class: Moderately well drained

Permeability: Slow (0.06-0.2 inch/hour)

Available water capacity: Gatewood—low (3 to 6
inches); Ocie—moderate (6 to 9 inches)

Organic matter content: Gatewood—moderately low
(1 to 2 percent); Ocie—moderate (2 to 4 percent)

Shrink-swell potential: High (6 to 9 percent)

Flooding: None

Water table: 18 to 36 inches

73028—Rueter-Bardley complex, 15 to 60 percent slopes

Setting

Landform: Hill

Position on the landform: Backslope

Parent material: Gravelly slope alluvium over clayey
residuum

Composition

Rueter and similar soils—50 percent

Bardley and similar soils—40 percent

Minor components—10 percent

Alred

Gasconade

Ocie

Rock outcrop

Typical Profile

Rueter

A—0 to 5 inches; extremely gravelly silt loam

E—5 to 13 inches; extremely gravelly silt loam

Bt1—13 to 42 inches; extremely gravelly silt loam

2Bt2—42 to 80 inches; very gravelly clay

Bardley

A—0 to 4 inches; extremely gravelly silt loam

E—4 to 8 inches; very gravelly silt loam

2Bt—8 to 27 inches; clay

3R—27 inches; unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Rueter—very deep (more than 60 inches); Bardley—moderately deep (20 to 40 inches)

Drainage class: Rueter—somewhat excessively drained, Bardley—well drained

Permeability: Rueter—moderate (0.6 inch-2.0 inches/hour); Bardley—slow (0.06-0.2 inch/hour)

Available water capacity: Rueter—low (3 to 6 inches); Bardley—very low (0 to 3 inches)

Organic matter content: Moderately low (1 to 2 percent)

Shrink-swell potential: Rueter—moderate (3 to 6 percent); Bardley—high (6 to 9 percent)

Flooding: None

Water table: None

73029—Gasconade-Gatewood-Rock outcrop complex, 3 to 15 percent slopes (fig. 13)

Setting

Landform: Hill

Parent material: Gasconade—gravelly residuum; Gatewood—gravelly slope alluvium over clayey residuum; Rock outcrop—no data

Composition

Gasconade and similar soils—50 percent

Gatewood and similar soils—20 percent

Rock outcrop—20 percent

Minor components—10 percent

Blueye

Moko



Figure 13.—A stand of eastern redcedar and warm-season grasses in an area of Gasconade-Gatewood-Rock outcrop complex, 3 to 15 percent slopes.

Typical Profile**Gasconade**

A—0 to 7 inches; very gravelly silty clay loam
 Bw—7 to 14 inches; very gravelly clay
 2R—14 inches; unweathered bedrock

Gatewood

A—0 to 2 inches; very gravelly silt loam
 E—2 to 5 inches; very gravelly silt loam
 2Bt—5 to 36 inches; gravelly clay
 3R—36 inches; unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Gasconade—very shallow and shallow (4 to 20 inches); Gatewood—moderately deep (20 to 40 inches); Rock outcrop—(0 inches)
Drainage class: Gasconade—somewhat excessively drained, Gatewood—moderately well drained; Rock outcrop—no data
Permeability: Gasconade—moderately slow (0.2-0.6 inch/hour); Gatewood—slow (0.06-0.2 inch/hour); Rock outcrop—no data
Available water capacity: Gasconade—very low (0 to 3 inches); Gatewood—low (3 to 6 inches); Rock outcrop—no data
Organic matter content: Gasconade—moderate (2 to 4 percent); Gatewood—moderately low (1 to 2 percent); Rock outcrop—no data
Shrink-swell potential: Gasconade—moderate (3 to 6 percent); Gatewood—high (6 to 9 percent); Rock outcrop—no data
Flooding: None
Water table: Gasconade and Gatewood—18 to 36 inches; Rock outcrop—no data

73030—Gasconade very gravelly clay loam, very rocky, 35 to 50 percent slopes, extremely stony

Setting

Landform: Hill and bluff
Parent material: Gravelly residuum

Composition

Gasconade and similar soils—80 percent
 Minor components—20 percent
 Blueye
 Gatewood
 Rock outcrop
 Vertical escarpments

Typical Profile

A—0 to 7 inches; very gravelly clay loam
 Bw—7 to 14 inches; very gravelly clay
 2R—14 inches; unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Very shallow and shallow (4 to 20 inches)
Drainage class: Somewhat excessively drained
Permeability: Moderately slow (0.2-0.6 inch/hour)
Available water capacity: Very low (0 to 3 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: None

73032—Gatewood very gravelly silt loam, 3 to 15 percent slopes, stony

Setting

Landform: Hill
Parent material: Gravelly slope alluvium over clayey residuum

Composition

Gatewood and similar soils—80 percent
 Minor components—20 percent
 Bendavis
 Gasconade
 Ocie
 Rock outcrop

Typical Profile

A—0 to 2 inches; very gravelly silt loam
 E—2 to 5 inches; very gravelly silt loam
 2Bt—5 to 36 inches; clay
 3R—36 inches; unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Moderately deep (20 to 40 inches)
Drainage class: Moderately well drained
Permeability: Slow (0.06-0.2 inch/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 18 to 36 inches

73033—Gatewood extremely gravelly silt loam, very rocky, 15 to 35 percent slopes, very stony

Setting

Landform: Hill

Position on the landform: Backslope

Parent material: Gravelly slope alluvium over clayey residuum

Composition

Gatewood and similar soils—80 percent

Minor components—20 percent

Bendavis

Moko

Ocie

Rock outcrop

Typical Profile

A—0 to 2 inches; extremely gravelly silt loam

E—2 to 5 inches; very gravelly silt loam

2Bt—5 to 36 inches; clay

3R—36 inches; unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Moderately deep (20 to 40 inches)

Drainage class: Moderately well drained

Permeability: Slow (0.06-0.2 inch/hour)

Available water capacity: Low (3 to 6 inches)

Organic matter content: Moderately low (1 to 2 percent)

Shrink-swell potential: High (6 to 9 percent)

Flooding: None

Water table: 18 to 36 inches

73051—Winnipeg silt loam, 2 to 5 percent slopes

Setting

Landform: Hill

Position on the landform: Footslope

Parent material: Silty loess over silty colluvium

Composition

Winnipeg and similar soils—80 percent

Minor components—20 percent

Clarksville

Pomme

Poynor

Viraton

Typical Profile

Ap—0 to 6 inches; silt loam

Bt1—6 to 16 inches; silt loam

2Bt2—16 to 44 inches; silty clay loam

3Bt3—44 to 80 inches; gravelly silty clay loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 inch-2.0 inches/hour)

Available water capacity: High (9 to 12 inches)

Organic matter content: Moderately low (1 to 2 percent)

Shrink-swell potential: Moderate (3 to 6 percent)

Flooding: None

Water table: None

74626—Tanglenook silt loam, 0 to 3 percent slopes, rarely flooded

Setting

Landform: Stream terrace

Parent material: Silty slope alluvium over silty and clayey alluvium

Composition

Tanglenook and similar soils—95 percent

Minor components—5 percent

Hartville

Moniteau

Typical Profile

Ap—0 to 6 inches; silt loam

A—6 to 17 inches; silty clay loam

Bt—17 to 30 inches; silty clay

Btg—30 to 56 inches; silty clay

Cg—56 to 80 inches; silty clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)

Drainage class: Poorly drained

Permeability: Slow (0.06-0.2 inch/hour)

Available water capacity: Moderate (6 to 9 inches)

Organic matter content: Moderate (2 to 4 percent)

Shrink-swell potential: High (6 to 9 percent)

Flooding: Rare (1 to 5 percent chance in any year)

Water table: 0 to 18 inches

74627—Hartville silt loam, 1 to 3 percent slopes, rarely flooded

Setting

Landform: Stream terrace

Parent material: Silty and clayey alluvium

Composition

Hartville and similar soils—90 percent

Minor components—10 percent

Bearthicket

Britwater

Tanglenook

Typical Profile

Ap—0 to 7 inches; silt loam

E—7 to 11 inches; silt loam

Bt1—11 to 40 inches; silty clay

2Bt2—40 to 80 inches; silty clay loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Permeability: Slow (0.06-0.2 inch/hour)

Available water capacity: Moderate (6 to 9 inches)

Organic matter content: Moderately low (1 to 2 percent)

Shrink-swell potential: High (6 to 9 percent)

Flooding: Rare (1 to 5 percent chance in any year)

Water table: 12 to 30 inches

75377—Racket silt loam, 0 to 3 percent slopes, frequently flooded**Setting**

Landform: Flood plain

Parent material: Loamy alluvium

Composition

Racket and similar soils—80 percent

Minor components—20 percent

Cedargap

Dapue

Riverwash

Typical Profile

A—0 to 21 inches; silt loam

Bw—21 to 42 inches; silt loam

2C—42 to 80 inches; stratified extremely gravelly sand to gravelly loamy sand

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 inch-2.0 inches/hour)

Available water capacity: High (9 to 12 inches)

Organic matter content: Moderately low (1 to 2 percent)

Shrink-swell potential: Moderate (3 to 6 percent)

Flooding: Frequent (more than a 50 percent chance in any year)

Water table: 48 to 72 inches

75379—Kaintuck loam, 0 to 3 percent slopes, frequently flooded**Setting**

Landform: Flood plain

Parent material: Loamy alluvium and sandy alluvium

Composition

Kaintuck and similar soils—85 percent

Minor components—15 percent

Cedargap

Dapue

Racket

Riverwash

Typical Profile

Ap—0 to 6 inches; loam

C1—6 to 45 inches; stratified fine sandy loam to silt loam

C2—45 to 80 inches; stratified loamy sand to fine sandy loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately rapid (2.0-6.0 inches/hour)

Available water capacity: Moderate (6 to 9 inches)

Organic matter content: Moderately low (1 to 2 percent)

Shrink-swell potential: Low (0 to 3 percent)

Flooding: Frequent (more than a 50 percent chance in any year)

Water table: None

75380—Dapue silt loam, 0 to 3 percent slopes, occasionally flooded**Setting**

Landform: Flood plain

Parent material: Silty alluvium

Composition

Dapue and similar soils—85 percent

Minor components—15 percent

Bearthicket

Cedargap

Racket

Typical Profile

Ap—0 to 9 inches; silt loam

A—9 to 15 inches; silt loam

Bw—15 to 80 inches; silt loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: High (9 to 12 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: Low (0 to 3 percent)
Flooding: Occasional (5 to 50 percent chance in any year)
Water table: None

75381—Bearthicket silt loam, 0 to 3 percent slopes, rarely flooded**Setting**

Landform: Flood plain
Parent material: Silty alluvium

Composition

Bearthicket and similar soils—90 percent
 Minor components—10 percent
 Britwater
 Cedargap
 Dapue
 Moniteau

Typical Profile

Ap—0 to 10 inches; silt loam
 Bt1—10 to 48 inches; silt loam
 Bt2—48 to 80 inches; silt loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: High (9 to 12 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: Low (0 to 3 percent)
Flooding: Rare (1 to 5 percent chance in any year)
Water table: None

75382—Cedargap gravelly loam, 0 to 3 percent slopes, frequently flooded**Setting**

Landform: Flood plain
Parent material: Gravelly alluvium

Composition

Cedargap and similar soils—80 percent

Minor components—20 percent

Dapue
 Racket
 Areas with lighter surfaces
 Wetter areas with more clay in the subsoil

Typical Profile

A—0 to 8 inches; gravelly loam
 Bw—8 to 46 inches; very gravelly loam
 C—46 to 80 inches; very gravelly clay loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: High (4 to 8 percent)
Shrink-swell potential: Low (0 to 3 percent)
Flooding: Frequent (more than a 50 percent chance in any year)
Water table: 48 to 72 inches

75383—Cedargap silt loam, 0 to 3 percent slopes, frequently flooded**Setting**

Landform: Flood plain
Parent material: Gravelly alluvium

Composition

Cedargap and similar soils—90 percent
 Minor components—10 percent
 Dapue
 Racket
 Areas with lighter surfaces
 Wetter areas with more clay in the subsoil

Typical Profile

Ap—0 to 8 inches; silt loam
 Bw—8 to 46 inches; very gravelly loam
 C—46 to 80 inches; very gravelly clay loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: High (4 to 8 percent)
Shrink-swell potential: Low (0 to 3 percent)
Flooding: Frequent (more than a 50 percent chance in any year)
Water table: 48 to 72 inches

99000—Pits, quarries

Composition

- Pits, quarries—85 percent
- Minor components—15 percent
 - Bluffs
 - Gravel piles
 - Water

99001—Water

- Lakes, ponds, and rivers

99002—Orthents, borrow area, clayey

Composition

- Orthents, clayey—85 percent
- Minor components—15 percent
 - Rock outcrop
 - Stony clayey soils
 - Very gravelly clayey soils
 - Water

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 54,664 acres in the survey area, or nearly 10.5 percent of the total acreage, meets the soil requirements for prime farmland.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed below. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify as prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name below. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.

The soils identified as prime farmland in Laclede County are:

- 66000 Moniteau silt loam, 0 to 2 percent slopes, occasionally flooded (where drained)
- 70006 Crelton silt loam, 1 to 3 percent slopes
- 71250 Britwater silt loam, 1 to 3 percent slopes, rarely flooded
- 73007 Plato silt loam, 1 to 3 percent slopes
- 73051 Winnipeg silt loam, 2 to 5 percent slopes
- 74626 Tanglenook silt loam, 0 to 3 percent slopes, rarely flooded (where drained)
- 74627 Hartville silt loam, 1 to 3 percent slopes, rarely flooded
- 75377 Racket silt loam, 0 to 3 percent slopes, frequently flooded (where protected from flooding or not frequently flooded during the growing season)

- 75379 Kaintuck loam, 0 to 3 percent slopes,
frequently flooded (where protected from
flooding or not frequently flooded during the
growing season)
- 75380 Dapue silt loam, 0 to 3 percent slopes,
occasionally flooded

- 75381 Bearthicket silt loam, 0 to 3 percent slopes,
rarely flooded
- 75383 Cedargap silt loam, 0 to 3 percent slopes,
frequently flooded (where protected from
flooding or not frequently flooded during the
growing season)

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Kees W. VanderMeer, district conservationist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture

plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Natural Resources Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Most of the soils in the survey area are used as pasture, hayland, or woodland. Row crops and small grain crops, mainly winter wheat, corn, and grain sorghum, are the principal cultivated crops. Tall fescue, orchardgrass, alfalfa, lespedeza, red clover, and sudangrass are the major forage-producing plants.

The major limitations to use and management of the soils for field and pasture crops are erodibility, wetness, and droughtiness. All soils need management to help conserve water, maintain or increase the organic matter content and fertility level, and preserve good tilth. A combination of vegetative and mechanical practices is needed for controlling erosion.

Good management of the soil resources significantly increases crop and pasture yields. The management practices needed for most of the soils that are suited to crops and pasture are briefly discussed in the following paragraphs.

High fertility levels increase the yields of grain and forage. The kind and amount of soil amendments needed to maintain or increase fertility levels can be determined by soil tests. Maintaining a complete record of the kind and amount of fertilizers applied, the time amendments were made, and the yields obtained is desirable to properly evaluate effectiveness. Dense-growing crops reduce the destructive impact of falling raindrops on the soil. Residue left on the surface after harvest can increase the organic matter content and keep the soil porous, thereby increasing the intake rate and the available water capacity.

Managing plant residue so that it is left on or near the surface can retard runoff and help to control

erosion. The effectiveness in controlling erosion depends on the amount of residue and the length of time it is left on the surface. Thus, spring plowing that allows residue to remain on the surface over winter is more effective than fall plowing. The use of tillage implements that leave residue on the surface during the growing season is desirable.

A system of conservation tillage that leaves a protective cover of crop residue on the surface throughout the year helps to maintain good tilth, increases the rate of water infiltration, and reduces the susceptibility to erosion. Examples are chisel plowing and no-till planting.

If special management is applied, some soils can be intertilled year after year without excessive erosion. These include soils on bottomlands not subject to frequent flooding and some nearly level soils on uplands. The special management needed in these intensively cropped areas generally involves maintaining fertility, managing crop residue, and applying a system of conservation tillage. This management is used in combination with grassed waterways, terraces, diversions, strip cropping, contour farming, or drainage systems on bottomland.

Grassed waterways are effective in controlling erosion where natural drainageways accumulate runoff. Properly located, natural or constructed grassed waterways also serve as terrace outlets where terraces are needed. Waterways, which can be crossed by large machinery, can also be designed to make farm operations more convenient.

Field terraces reduce slope length and are effective in erosion control when used on cultivated soils that are sloping. Cultivated soils with slopes of more than 2 percent generally should be terraced and farmed on the contour. A system of terraces that are nearly parallel to each other is better than other systems, because it eliminates excessive point rows and makes farming more convenient.

Many good stands of grass-legume pastures have been established in the survey area. Pasture renovation and improved management are needed to control erosion and to increase forage production. A good pasture generally can be established if lime and fertilizer are applied according to the results of a current soil test; a firm seedbed is prepared; the recommended amount of pure, live seed is planted and covered with $\frac{1}{4}$ to $\frac{1}{2}$ inch of soil; all legume seeds are inoculated with proper bacteria within 24 hours of planting; weeds are controlled until seedlings are well established; and newly seeded areas are not grazed until the root systems are well established. Only adapted species of grasses and legumes should be

planted. Seeding dates for the different species may vary.

Good pasture management results in maximum production of forage, a good seasonal distribution of plant growth, and stands that are productive for long periods. It includes rotation grazing, restricted grazing during wet periods, measures that prevent overgrazing, selection of suitable forage species, measures that control brush and weeds, and applications of lime and fertilizer. If grazing is rotated, cross fencing and an adequate supply of water in each field are needed. If the plants are grazed too close to the ground, the stand is depleted and the extent of weeds is increased. Brush and weeds compete with the grasses and legumes for moisture, sunlight, and plant nutrients. They can be controlled by mowing or cutting and by spraying with chemicals.

Well-managed pastures generally include mixtures of cool-season grasses and legumes, which are grazed during spring and fall (fig. 14). Seeding the legumes with the grasses increases the amount, palatability, and nutritional value of the forage. Tall fescue can be stockpiled for use by beef herds and non-producing dairy cows in winter. Surplus spring growth of grasses and legumes can be baled to extend the grazing season and maintain feed quality.

The use of warm-season grasses, such as the bluestems, indiangrass, and switchgrass, can fill the need for good quality summer forage when cool-season plants are dormant. Fields of warm-season grasses should be separated from fields of cool-season grasses. Prescribed burning helps to control undesirable vegetation and improves the quality and quantity of warm-season grasses, but generally is not necessary more often than once every three to five years. The pasture should be burned only when a specific management objective is to be met.

Technical assistance in the planning and application of practices for the soils of a particular field or farm can be obtained from the Natural Resources Conservation Service through the Laclede County Soil and Water Conservation District.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the tables because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and



Figure 14.—A field of improved cool-season grasses in an area of the Wilderness-Viraton association.

results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in the table are grown in the survey area, but estimated yields are not listed

because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use.

Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation.

Class 7 soils have very severe limitations that make them unsuitable for cultivation.

Class 8 soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class number, for example, 2*e*. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability classification of the map units in this survey area is given in the yields table.

Pasture and Hayland Suitability Groups

The soils in Laclede County are assigned to a pasture and hayland group according to their suitability for pasture management.

Many different pasture and hayland suitability groups are in the survey area. Over time, the combination of plants best suited to a particular soil and climate has or will become dominant. Plant communities are not static but vary slightly from year to year and place to place.

The relationship between soils and vegetation was ascertained during this survey. Thus, pasture and hayland suitability groups generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of each plant species. Soil reaction, salt content, and a seasonal high water table are also important. The "Field Office Technical Guide," which is available at local offices of the Natural Resources Conservation Service, can provide specific information about pasture and hayland suitability groups.

Table 6 shows, for each soil, the assigned pasture and hayland suitability group. Specific concerns and recommendations for pasture and hayland management for each group are discussed below.

Group WLB—Wet Loamy Bottom. A seasonal high water table and flooding are the main management problems. Plants should be selected accordingly. A seedbed can be easily prepared. A drainage system can improve the growth of deep-rooted species. The hazard of flooding should be considered when a grazing system is designed.

Group WCB—Wet Clayey Bottom. Wetness and flooding are the main management problems. The soils in this group are poorly suited to hay. The hazard of flooding should be considered when a grazing system is designed. Maintaining stands of desirable species is difficult in depressional areas. A drainage system can improve the growth of deep-rooted species.

Group WCU—Wet Clayey Upland. Wetness is the main management concern. Maintaining stands of desirable species is difficult in depressional areas. A drainage system can improve the growth of deep-rooted species.

Group WLO—Wet Loamy Overflow. Wetness and flooding are the main management problems. A seedbed can be easily prepared. A drainage system can improve the growth of deep-rooted species. The

hazard of flooding should be considered when a grazing system is designed.

Group LyO—Loamy Overflow. Flooding is the main management problem. The hazard of flooding should be considered when a grazing system is designed.

Group LyU—Loamy Upland. No serious problems affect pasture and hayland management. Erosion is a hazard in newly seeded areas. Timely seedbed preparation is needed to ensure a good ground cover.

Group GrU—Gravelly Upland. The soils in this group generally are not suited to cultivated crops. Droughtiness and erosion are the main management problems. Seedbeds should be prepared on the contour. Timely seedbed preparation helps to ensure rapid plant growth and a protective ground cover.

Group MDU—Moderately Deep Upland. Shallow-rooted species that are tolerant of droughtiness should be selected for planting. Erosion is a serious hazard in newly seeded areas. Timely tillage and a quickly established ground cover reduce the hazard of erosion.

Group WtP—Wet Pan. The species that are tolerant of wetness grow best. A dense layer in the subsoil can restrict the rooting depth and result in insufficient soil moisture in dry years. Erosion during seedbed preparation is the main problem. Timely tillage and a quickly established ground cover reduce the hazard of erosion.

Group LyP—Loamy Pan. A few small areas of this group are used for cultivated crops, and some areas are wooded. A dense layer in the subsoil can restrict the rooting depth and result in insufficient soil moisture in dry years. Erosion during seedbed preparation is a hazard. Seedbeds should be prepared on the contour. Timely tillage and a quickly established ground cover reduce the hazard of erosion.

Group GrO—Gravelly Overflow. Most areas of this group have been cleared of trees and are used for pasture and hay. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during periods of flooding help to keep the pasture in good condition.

Group GrP—Gravelly Pan. If the soils in this group are used for improved pasture, chert on the surface hinders tillage. Because of seasonal droughtiness, timely planting is needed to ensure an adequate stand.

Erosion is a hazard in newly seeded areas. Timely seedbed preparation helps to ensure a protective ground cover.

Group ShU—Shallow Upland. Most areas of this group are used for native pasture and are best suited to shallow-rooted species. In some areas tillage is nearly impossible. Broadcast seeding may be necessary. The slope and rock outcrop can hinder mowing in places.

Group GNS—Generally Not Suited. The soils in this group generally are not suited to pasture and hay. The suitability for forage species and the use of equipment are limited by the slope, by a high content of rock fragments, or by both of these.

Woodland Management and Productivity

Richard J. Blatz, assistant resource forester, Missouri Department of Conservation, helped prepare this section.

Approximately 42 percent of the land in Laclede County is forested (USDA, 1992). There are three broad forest type groupings that occur in Missouri—upland central hardwood, northern hardwood, and southern hardwood and associated eastern hardwood. The upland central hardwood forest type is where Laclede County is located. The primary forest cover is oak-hickory. The most common species are white oak, black oak, post oak, blackjack oak, and hickories. Other common species are black walnut, northern red oak, sycamore, elm, and ash (fig. 15).

Soil provides all the essential elements required in tree growth, except carbon dioxide and some oxygen. Soil also stores water and provides a medium in which trees are anchored. Many soil properties affect tree growth and influence tree species, such as structure, texture, density, permeability, and soil depth. For example, white oak develops better on deep, moist soils, whereas post oak and blackjack oak are more prevalent on dry sites with shallow soils.

Microorganisms are an important part of forest soil systems. Microorganisms break down the leaf litter and dead woody material to provide nutrients to tree roots. Fire and excessive grazing by livestock destroy microorganisms and remove the leaf litter. This results in the loss of nutrients available to the tree roots, which reduces productivity of the land.

Aspect also influences tree growth. North- and east-facing slopes typically have deeper soils and more available moisture. These sites produce a better quality tree. The dominant species that are found on these sites are white oak, black oak, northern red oak, and black walnut. Management practices commonly include



Figure 15.—A stand of northern red oak in an area of Poynor very gravelly silt loam, 1 to 8 percent slopes.

timber harvest, timber stand improvement, and thinning.

South- and west-facing slopes are typically droughty with shallower soils. These sites produce a slow growing, low quality tree. The dominant species that are found on these sites are post oak, blackjack oak, and hickories. Management should be limited and sites protected from fire and grazing.

The bottomland soils along streams and tributaries support white oak, northern red oak, sycamore, black walnut, ash, and elm. Tree quality and growth in these areas can be good or excellent. Caution should be taken when applying management practices in bottomland areas. Riparian corridors or strips of trees along streams and tributaries should be protected. Riparian corridors slow floodwater and help prevent streambank erosion. The roots from the trees within these corridors hold the soil in place and keep the soil from eroding away.

Many forest sites within Laclede County have the potential to produce high quality timber stands. However, because of past forest fires and overgrazing, the conditions of the timber stands within the county are lower than their potential. Many stands still harbor the scars from past forest fires. Fire scars allow insects and disease to enter the tree. This results in lower timber quality. Overgrazing has caused soil compaction, soil erosion, and root damage. It has also adversely affected regeneration and caused the depletion of understory plants. Timber quality and growth rates have been seriously reduced on many forest sites because of these practices. Woodland management should include fire prevention and protection from overgrazing.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce in a pure stand under natural conditions. The number 1 indicates low potential productivity; 2 or 3, moderate; 4 or 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*,

clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; *L*, low strength; and *N*, snowpack. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: *R*, *X*, *W*, *T*, *D*, *C*, *S*, *F*, *L*, and *N*.

In the table, *slight*, *moderate*, and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra

precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in the table are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service or of the Cooperative Extension Service or from a commercial nursery.

Recreation

Two state agencies, the Missouri Department of Conservation and the Department of Natural Resources, own and maintain many areas available for public use. The Missouri Department of Conservation maintains five river access points as well as approximately 1,700 acres of various size parcels throughout the county.

Bennett Spring State Park contains 3,064 acres. Within the State Park, the Department of Natural Resources maintains over 200 campsites and many hiking trails. During the trout fishing season, which runs from March 1 to October 31, trout are released daily in Bennett Spring Branch, which flows into the Niangua River.

There are several commercially operated campgrounds and canoe rentals in the county, which allow ample opportunity to enjoy over 110 miles of

quality floating and fishing offered by the Gasconade and Niangua Rivers and the Osage Fork of the Gasconade River. In Laclede County, Mark Twain National Forest has 28,688 acres open to the public for outdoor recreational activities, such as hunting, fishing, hiking, and camping.

The county seat of Laclede County, Lebanon, operates public parks within the city limits containing ballparks, fitness trails, and a swimming pool.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In the table, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in the table can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Elizabeth A. Stricklen, conservation agent, Missouri Department Of Conservation, helped prepare this section.

Laclede County is located in south-central Missouri in the northern Ozarks. The county is 42 percent forested, and the predominant habitat type is oak-hickory hardwood forest. Approximately 6 percent of the county, or 43 square miles, is in presettlement native prairie. Laclede County is crossed by three major rivers. All three are spring fed, rock bottom, fast flowing, and usually clear. On the west is the Niangua River, on the south and in the center of the county is the Osage Fork of the Gasconade River, and on the east is the largest of the three, the Gasconade River.

All of the rivers support an excellent population of smallmouth bass. Also present are largemouth bass, catfish, suckers, rock bass, and quite a variety of sunfish and minnows. Crawdads and mussels are important food sources for wildlife present on all the rivers and some small streams. The Niangua River is stocked with rainbow trout from the Bennett Spring

State Park Hatchery. The Bennett Spring State Park spring branch also provides trout fishing opportunities.

The rivers provide habitat to a large number of furbearers. Beaver, muskrat, and mink are found along all of the rivers. The Department of Conservation has started reintroducing the river otter along the Niangua River. The program is showing signs of success with an occasional sighting of an adult otter with young. Maintaining the water quality of the rivers and habitat of the watersheds is very important in continuing the good health of the wildlife populations in Laclede County.

A description and the location of the following soil associations are found in the section "General Soil Map Units."

The Rueter-Bardley-Clarksville association is heavily forested with oak and hickory as the dominant tree species. Areas in this association experience a great deal of fire damage every spring and fall, whenever enough fuel has accumulated to sustain a fire. This association has a very high deer population and a good population of fox and gray squirrels, wild turkey, coyotes and bobcats.

The Clarksville-Poynor and Poynor-Tonti associations are scattered throughout Laclede County and support a forest edge community (fig. 16). The acreage in these associations is not as heavily forested as the Rueter-Bardley-Clarksville association. Land use is varied with a greater population of people and small pasture-farm operations than the Rueter-Bardley-Clarksville association. While the Clarksville-Poynor and Poynor-Tonti associations support a good population of deer and turkey, grazing of woodland is a major problem affecting the wildlife resource. Wild turkey flocks are quick to take advantage of any generous rancher who grains cattle through the winter. Wild turkey, deer, and squirrels are very dependent on the mast crop produced each year, and their population and visibility vary accordingly.

The Wilderness-Viraton and Plato-Creldon associations have the largest population of people and the smallest percent of forest cover of all the soil associations in Laclede County. These associations include open areas with small woodlots and a high percentage of pastureland and dairy operations. Besides deer, turkey, and squirrels, these associations support the county's highest concentrations of songbirds, doves, rabbits, foxes, and quail.

The Gatewood-Ocie association is in the central and eastern portions of Laclede County. Most of the woodland in this association is dominated by oak-hickory hardwood forest. The yearly quail, rabbit, and dove population surveys are usually within the Gatewood-Ocie association. This association has a



Figure 16.—View of an area of the Clarksville-Poynor association bordering the Gasconade River showing typical land uses of pasture and timber.

greater number of wildlife species because of more diversity in habitat types. To increase the number of small game animals, such as rabbits and quail, more cover needs to be provided and the habitat they now occupy needs to be protected.

Most of the cultivated cropland in Laclede County is in areas of the Cedargap-Dapue-Racket association. The chief grain crops are corn, soybeans, and winter wheat. A reduction in the extent of fall plowing on cropland is needed. A system of conservation tillage leaves a protective cover of crop residue and waste grain on the surface after harvest, which provides additional winter food and limited cover for wildlife.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated

according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be

expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict

certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil

properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water

capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

The table also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

The table gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is

used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good*, *fair*, or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the

engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land

against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of

the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 17). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt,

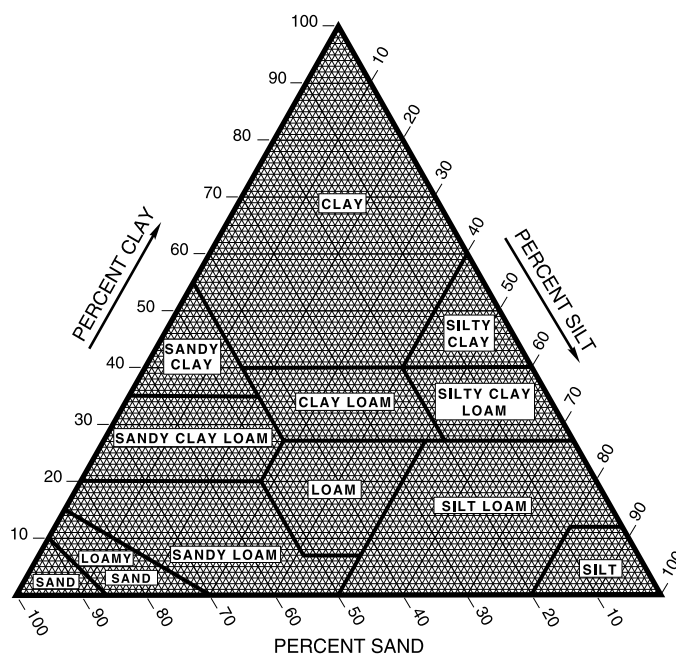


Figure 17.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting

engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Sand as a soil separate consists of mineral soil particles that are less than 2 millimeters and greater than or equal to 0.05 millimeter in diameter.

Silt as a soil separate consists of mineral soil particles that are greater than or equal to 0.002 millimeter but less than 0.05 millimeter in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter.

In this table, the estimated *sand*, *silt*, and *clay* content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of *sand*, *silt*, and *clay* greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of sand, silt, and clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $\frac{1}{3}$ -bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity (Ksat) refers to the amount of water that would move vertically through a unit time under unit hydraulic gradient. The estimates are in micrometers per second and indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (Ksat) is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by

plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Cation-exchange capacity is the total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. Soils having a high cation-exchange capacity can retain cations. The ability to retain cations helps to prevent the pollution of ground water.

Effective cation-exchange capacity is the sum of ammonium acetate extractable bases plus potassium chloride extractable aluminum used for soils that have pH value less than 5.5. Effective cation-exchange capacity is expressed in terms of milliequivalents per 100 grams.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on the basis of measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the

change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, more than 6 percent; and *very high*, greater than 9 percent.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Erosion factor Kw (formerly K factor) indicates the susceptibility of a soil to sheet and rill erosion by water. Factor Kw is one of six factors used in the Universal Soil Loss Equation (USLE), and may be used in the Revised Universal Soil Loss Equation (RUSLE), to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Factor Kw is adjusted for the effect of rock fragments. Values of Kw range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size. Factor Kf is one of the factors that may be used in the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion.

Soil Features

Table 17 gives estimates of several important soil features. The estimates are used in land use planning that involves engineering considerations.

Depth to bedrock is given if bedrock is within a depth of 60 inches. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

A *cemented pan* is a nearly continuous layer of indurated or strongly cemented material that is hard and brittle. The particles are held together by cementing substances, such as calcium carbonate and oxides of silicon, iron, or aluminum. Pans are identified when they are within a depth of 60 inches. They are classified as thin or thick. A thin pan can be excavated by trenching machines, backhoes, small rippers, and other equipment commonly used to dig excavations for pipelines, sewer lines, and graves. A thick pan is so thick or massive that blasting or special equipment is needed when excavations are made.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors

considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

A *low* potential for frost action indicates that the soil is rarely susceptible to the formation of ice lenses; a *moderate* potential indicates that the soil is susceptible to the formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength; and a *high* potential indicates that the soil is highly susceptible to the formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Water Features

Table 18 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in the table, the first letter is for drained areas and the second is for undrained areas.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 18 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 18 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare,

occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and frequency are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

FAMILY. Families are established within a subgroup

on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is very-fine, mixed, active, mesic Typic Hapludalfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (USDA, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA, 1999) and in "Keys to Soil Taxonomy" (USDA, 1998). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Alred Series

The Alred series consists of very deep, well drained soils on uplands. Permeability is moderate in the upper subsoil and slow in the lower subsoil. These soils formed in gravelly slope alluvium over clayey residuum. Slopes range from 8 to 15 percent.

Soils of the Alred series are loamy-skeletal over clayey, siliceous, semiactive, mesic Typic Paleudalfs.

Typical pedon of Alred very gravelly silt loam, in an area of Alred-Bardley complex, 8 to 15 percent slopes;

1,000 feet east and 400 feet south of the northwest corner of sec. 7, T. 35 N., R. 17 W.; USGS Eldridge West topographic quadrangle; latitude 37 degrees 47 minutes 35 seconds N.; longitude 92 degrees 51 minutes 12 seconds W.

- A—0 to 4 inches; dark grayish brown (10YR 4/2) very gravelly silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; many fine and medium roots; 50 percent chert gravel; very strongly acid; clear smooth boundary.
- E—4 to 9 inches; yellowish brown (10YR 5/4) very gravelly silt loam; weak fine granular structure; friable; many fine and medium and common coarse roots; 55 percent chert gravel; very strongly acid; clear smooth boundary.
- Bt1—9 to 17 inches; brown to dark brown (7.5YR 4/4) and yellowish brown (10YR 5/4) very gravelly silt loam; weak fine subangular blocky structure; friable; many fine and medium and common coarse roots; few distinct discontinuous clay films on faces of peds; 45 percent chert gravel; very strongly acid; gradual smooth boundary.
- Bt2—17 to 26 inches; yellowish red (5YR 4/6) and brown (7.5YR 5/4) very gravelly silty clay loam; weak fine subangular blocky structure; friable; few fine and medium roots; common distinct discontinuous clay films on faces of peds; 40 percent chert gravel; very strongly acid; clear smooth boundary.
- 2Bt3—26 to 37 inches; strong brown (7.5YR 4/6) gravelly clay; many fine and medium prominent dark red (2.5YR 3/6) mottles; weak fine subangular blocky structure; firm; few fine and medium roots; many distinct continuous clay films on faces of peds; 30 percent chert gravel; very strongly acid; abrupt smooth boundary.
- 2Bt4—37 to 48 inches; yellowish red (5YR 4/6) and strong brown (7.5YR 4/6) clay; weak medium subangular blocky structure; very firm; few fine and medium roots; many distinct continuous clay films on faces of peds; 10 percent chert gravel; very strongly acid; clear smooth boundary.
- 2Bt5—48 to 80 inches; dark red (2.5YR 3/6) clay; common medium prominent brown to dark brown (7.5YR 4/4) mottles; weak coarse subangular blocky structure; very firm; few fine and medium roots; few prominent discontinuous non-intersecting slickensides on vertical and horizontal faces of peds and many continuous clay films on faces of peds; 10 percent chert gravel; very strongly acid.

Coarse fragment content ranges from 35 to 60 percent in the A horizon, 35 to 80 percent in the E and Bt horizons, and 5 to 30 percent in the 2Bt horizon.

The A horizon has value of 3 or 4 and chroma of 2 or 3. The E horizon has value of 5 or 6 and chroma of 3 or 4. The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 3, 4, or 6. The 2Bt horizon has hue of 2.5YR to 10YR, value of 3 to 6, and chroma 4 or 6. It is clay, silty clay, or the gravelly analogues of these textures.

Bardley Series

The Bardley series consists of moderately deep, well drained, slowly permeable soils on uplands and backslopes. These soils formed in gravelly slope alluvium over clayey residuum. Slopes range from 8 to 60 percent.

Soils of the Bardley series are very-fine, mixed, active, mesic Typic Hapludalfs.

Typical pedon of Bardley very gravelly silt loam, in an area of Alred-Bardley complex, 8 to 15 percent slopes; 1,500 feet west and 2,000 feet south of the northeast corner of sec. 10, T. 36 N., R. 17 W.; USGS Ha Ha Tonka topographic quadrangle; latitude 37 degrees 52 minutes 32 seconds N.; longitude 92 degrees 47 minutes 08 seconds W.

- A—0 to 2 inches; brown (10YR 4/3) very gravelly silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many fine and medium roots; 55 percent chert gravel; strongly acid; clear smooth boundary.
- E—2 to 8 inches; light yellowish brown (10YR 6/4) very gravelly silt loam; weak fine granular structure; friable; many fine and medium and few coarse roots; 60 percent chert gravel; strongly acid; clear smooth boundary.
- 2Bt1—8 to 13 inches; red (2.5YR 4/6) clay; weak fine subangular blocky structure; firm; few fine and medium roots; few distinct discontinuous clay films on faces of peds; 5 percent chert gravel; strongly acid; clear smooth boundary.
- 2Bt2—13 to 22 inches; red (2.5YR 4/6) clay; many fine and medium prominent strong brown (7.5YR 5/6) mottles; moderate fine subangular blocky structure; firm; few fine and medium roots; few prominent discontinuous clay films on faces of peds; strongly acid; gradual smooth boundary.
- 2Bt3—22 to 33 inches; red (2.5YR 4/6) and strong brown (7.5YR 5/6) clay; weak fine subangular blocky structure; firm; few fine and medium roots; common prominent continuous clay films on faces of peds; strongly acid; abrupt smooth boundary.

2C—33 to 35 inches; red (2.5YR 4/6) and yellowish red (5YR 5/6) sandy clay loam; massive; firm; few fine roots; neutral; abrupt boundary.

3R—35 inches; dolostone bedrock.

The depth to bedrock ranges from 20 to 38 inches. Coarse fragment content ranges from 35 to 70 percent in the A horizon, 40 to 60 percent in the E horizon, and 0 to 30 percent in the 2Bt horizon.

The A horizon has value of 3 or 4 and chroma of 2 or 3. It is very gravelly or extremely gravelly silt loam. The E horizon has value of 5 or 6 and chroma of 3 or 4. It is silt loam, gravelly silt loam, very gravelly silt loam, or extremely gravelly silt loam. The 2Bt horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3, 4, or 5, and chroma of 3, 4, 6, or 8. It is clay, silty clay, or the gravelly analogues of these textures.

Bearthicket Series

The Bearthicket series consists of very deep, well drained, moderately permeable soils on flood plains. These soils formed in silty alluvium. Slopes range from 0 to 3 percent.

Soils of the Bearthicket series are fine-silty, mixed, active, mesic Ultic Hapludalfs.

Typical pedon of Bearthicket silt loam, 0 to 3 percent slopes, rarely flooded; 50 feet east and 400 feet north of the southwest corner of sec. 35, T. 34 N., R. 13 W.; USGS Winnipeg topographic quadrangle; latitude 37 degrees 36 minutes 18 seconds N.; longitude 92 degrees 20 minutes 29 seconds W.

Ap—0 to 10 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; few very fine and fine roots; moderately acid; clear smooth boundary.

Bt1—10 to 20 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; few very fine and fine roots; common distinct discontinuous clay films on faces of peds; moderately acid; clear smooth boundary.

Bt2—20 to 29 inches; brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; firm; few very fine and fine roots; common distinct discontinuous clay films on faces of peds; moderately acid; clear smooth boundary.

Bt3—29 to 43 inches; brown (7.5YR 4/3) silt loam; weak fine subangular blocky structure; firm; few very fine roots; very few faint discontinuous silt coats in root channels; common distinct clay films on faces of peds; moderately acid; clear smooth boundary.

Bt4—43 to 48 inches; brown (7.5YR 4/3) silt loam;

weak fine subangular blocky structure; firm; few very fine roots; very few distinct discontinuous silt coats in root channels; common distinct discontinuous clay films on faces of peds; moderately acid; clear smooth boundary.

Bt5—48 to 80 inches; brown (7.5YR 4/3) silt loam; weak fine subangular blocky structure; firm; few very fine roots; very few distinct discontinuous silt coats in root channels; common distinct discontinuous clay films on faces of peds; few fine black manganese concretions; moderately acid.

The Ap horizon has hue of 7.5YR or 10YR, value of 3, 4, or 5, and chroma of 2, 3, or 4. The Bt horizon has value of 4 or 5 and chroma of 3, 4, or 6. It is silt loam or silty clay loam.

Bendavis Series

The Bendavis series consists of moderately deep, moderately well drained, moderately permeable soils on uplands. These soils formed in gravelly slope alluvium. Slopes range from 15 to 50 percent.

Soils of the Bendavis series are loamy-skeletal, siliceous, active, mesic Typic Hapludults.

Typical pedon of Bendavis extremely gravelly silt loam, in an area of Bendavis-Poynor complex, rocky, 15 to 50 percent slopes, very stony; 1,900 feet east and 900 feet north of the southwest corner of sec. 15, T. 33 N., R. 13 W.; USGS Winnipeg topographic quadrangle; latitude 37 degrees 33 minutes 49 seconds N.; longitude 92 degrees 21 minutes 14 seconds W.

A—0 to 3 inches; dark grayish brown (10YR 4/2) extremely gravelly silt loam, very pale brown (10YR 7/3) dry; weak fine granular structure; friable; many fine and medium roots; 65 percent chert gravel; extremely acid; clear smooth boundary.

BA—3 to 10 inches; brown (10YR 5/3) very gravelly silt loam; weak fine granular structure; friable; common fine, medium, and coarse roots; 55 percent chert gravel; very strongly acid; clear smooth boundary.

Bt1—10 to 18 inches; yellowish brown (10YR 5/4) very gravelly silt loam; weak fine subangular blocky structure; friable; few fine roots; few faint discontinuous clay films on faces of peds; 45 percent chert gravel; very strongly acid; clear smooth boundary.

Bt2—18 to 26 inches; yellowish brown (10YR 5/4) and yellowish red (5YR 4/6) very gravelly silty clay loam; moderate fine subangular blocky structure; firm; few fine roots; few light yellowish brown (10YR 6/4) silt coats and common distinct discontinuous clay films on faces of peds; 50

percent chert gravel; very strongly acid; clear smooth boundary.

Bt3—26 to 36 inches; yellowish brown (10YR 5/6) extremely gravelly loam; weak fine subangular blocky structure; firm; few fine roots; few faint discontinuous clay films on faces of peds; 65 percent chert gravel; very strongly acid; abrupt irregular boundary.

2R—36 inches; chert bedrock.

The depth to bedrock ranges from 24 to 40 inches. Coarse fragment content ranges from 60 to 70 percent in the A horizon; 35 to 60 percent in the E horizon, where present; and 35 to 70 percent in the Bt horizon.

The A horizon has value of 3 or 4 and chroma of 2 or 3. The E horizon, where present, has value of 5 or 6 and chroma of 3 or 4. The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 3, 4, or 6.

Blueye Series

The Blueye series consists of moderately deep, moderately well drained, slowly permeable soils on upland summits. These soils formed in gravelly slope alluvium over clayey residuum. Slopes range from 3 to 8 percent.

Soils of the Blueye series are fine, mixed, active, mesic Typic Argiudolls.

Typical pedon of Blueye gravelly silt loam, 3 to 8 percent slopes; 180 feet west and 500 feet north of the southeast corner of sec. 19, T. 36 N., R. 15 W.; USGS Stoutland topographic quadrangle; latitude 37 degrees 50 minutes 7 seconds N.; longitude 92 degrees 36 minutes 51 seconds W.

Ap—0 to 4 inches; very dark grayish brown (10YR 3/2) gravelly silt loam, gray (10YR 5/1) dry; very weak very fine granular structure; friable; few fine roots; 15 percent chert gravel; neutral; clear smooth boundary.

A—4 to 11 inches; very dark grayish brown (10YR 3/2) very gravelly silt loam, grayish brown (10YR 5/2) dry; weak very fine granular structure; friable; few fine roots; 30 percent chert gravel and 5 percent chert cobbles; neutral; clear wavy boundary.

2Bt1—11 to 17 inches; brown (10YR 4/3) gravelly clay; many medium prominent red (2.5YR 4/6) mottles; moderate fine subangular blocky structure; very firm; few fine roots; many prominent continuous clay films on faces of peds; 30 percent chert gravel; neutral; clear smooth boundary.

2Bt2—17 to 29 inches; brown (10YR 4/3) and red (2.5YR 4/6) gravelly clay; weak fine subangular

blocky structure; very firm; few fine roots; many prominent continuous clay films on faces of peds; 15 percent chert gravel; neutral; clear smooth boundary.

2Bt3—29 to 34 inches; brown (10YR 4/3) clay; weak fine subangular blocky structure; very firm; few fine roots; common distinct discontinuous clay films on faces of peds; 5 percent chert gravel; slightly alkaline; abrupt smooth boundary.

3R—34 inches; dolostone bedrock.

The depth to bedrock ranges from 20 to 40 inches. Coarse fragment content ranges from 15 to 35 percent in the A horizon and 5 to 30 percent in the 2Bt horizon.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The 2Bt horizon has value of 3, 4, or 5.

Britwater Series

The Britwater series consists of very deep, well drained, moderately permeable soils on and stream terraces and footslopes. These soils formed in loamy alluvium and colluvium. Slopes range from 1 to 8 percent.

Soils of the Britwater series are fine-loamy, mixed, active, mesic Typic Paleudalfs.

Typical pedon of Britwater silt loam, 1 to 3 percent slopes, rarely flooded; 1,900 feet east and 250 feet south of the northwest corner of sec. 26, T. 34 N., R. 13 W.; USGS Brownfield topographic quadrangle; latitude 37 degrees 37 minutes 59 seconds N.; longitude 92 degrees 20 minutes 05 seconds W.

Ap—0 to 9 inches; brown (7.5YR 4/3) silt loam, brown (7.5YR 5/4) dry; weak fine granular structure; friable; common very fine and fine roots; few fine black manganese concretions; 3 percent chert gravel; moderately acid; abrupt smooth boundary.

Bt1—9 to 19 inches; brown (7.5YR 4/3) silty clay loam; common fine and medium distinct brown (10YR 4/3) mottles; weak fine subangular blocky structure; friable; few very fine and fine roots; very few distinct discontinuous manganese stains on vertical faces of peds and few distinct discontinuous clay films on faces of peds; common fine black (N 2/0) weakly cemented manganese concretions; 5 percent chert gravel; moderately acid; clear smooth boundary.

Bt2—19 to 25 inches; yellowish red (5YR 4/6) silty clay loam; common fine and medium distinct dark yellowish brown (10YR 4/4) mottles; weak fine subangular blocky structure; firm; few very fine roots; very few distinct discontinuous manganese stains and common distinct continuous clay films

on faces of peds; few fine black (N 2/0) weakly cemented manganese concretions; 8 percent chert gravel; moderately acid; abrupt smooth boundary.

2Bt3—25 to 47 inches; red (2.5YR 4/6) very gravelly clay loam; moderate fine subangular blocky structure; firm; few very fine roots; few distinct discontinuous manganese stains and many prominent continuous clay films on faces of peds; common fine black (N 2/0) weakly cemented manganese concretions; 45 percent chert gravel; moderately acid; abrupt smooth boundary.

2Bt4—47 to 80 inches; red (2.5YR 4/6) gravelly clay loam; common medium distinct brown to dark brown (7.5YR 4/4) mottles; weak fine subangular blocky structure; firm; few very fine and fine roots; many prominent continuous clay films on faces of peds; common fine black (N 2/0) weakly cemented manganese concretions; 15 percent chert gravel; moderately acid.

Coarse fragment content ranges from 0 to 20 percent in the A or Ap horizon, 5 to 25 percent in the Bt horizon, and 15 to 60 percent in the 2Bt horizon.

The A or Ap horizon has hue of 7.5YR or 10YR. The Bt horizon has hue of 5YR or 7.5YR, value of 4 or 5 and chroma of 4, 6, or 8. It is silt loam, silty clay loam, or the gravelly analogues of these textures. The 2Bt horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3, 4, or 5, and chroma of 4 or 6. It is clay loam, silty clay loam, silty clay, or the gravelly or very gravelly analogues of these textures.

Cedargap Series

The Cedargap series consists of very deep, well drained, moderately permeable soils on flood plains. These soils formed in gravelly alluvium. Slopes range from 0 to 3 percent.

Soils of the Cedargap series are loamy-skeletal, mixed, superactive, mesic Cumulic Hapludolls.

Typical pedon of Cedargap gravelly loam, 0 to 3 percent slopes, frequently flooded; 1,050 feet east and 250 feet north of the southwest corner of sec. 19, T. 34 N., R. 13 W.; USGS Drynob topographic quadrangle; latitude 37 degrees 38 minutes 08 seconds N.; longitude 92 degrees 24 minutes 46 seconds W.

A1—0 to 7 inches; very dark brown (10YR 2/2) gravelly loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; many fine and medium and few coarse roots; 30 percent chert gravel; slightly acid; clear smooth boundary.

A2—7 to 26 inches; black (10YR 2/1) very gravelly loam, very dark grayish brown (10YR 3/2) dry;

weak fine subangular blocky structure; friable; common fine and medium and few coarse roots; 40 percent chert gravel and 5 percent chert cobbles; slightly acid; clear smooth boundary.

Bw1—26 to 38 inches; dark brown (10YR 3/3) very gravelly loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; firm; few fine and medium roots; few faint discontinuous organic coats; 45 percent chert gravel; slightly acid; clear smooth boundary.

Bw2—38 to 50 inches; dark yellowish brown (10YR 4/4) very gravelly clay loam; weak fine subangular blocky structure; firm; few fine and medium roots; few distinct discontinuous organic coats; 40 percent chert gravel; slightly acid; gradual smooth boundary.

C—50 to 80 inches; brown (10YR 4/3) extremely gravelly clay loam; few fine yellowish brown (10YR 5/6) mottles and few fine dark grayish brown (10YR 4/2) iron depletions; weak fine subangular blocky structure; firm; few fine and medium roots; common distinct discontinuous organic coats; 60 percent chert gravel and 5 percent chert cobbles; neutral.

Coarse fragment content ranges from 5 to 60 percent in the A horizon and 35 to 80 percent in the Bw and C horizons.

The A horizon has value of 2 or 3 and chroma of 1, 2, or 3. It is silt loam, loam, or the gravelly or very gravelly analogues of these textures. The Bw and C horizons have hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 2, 3, or 4. Texture is the very gravelly or extremely gravelly analogues of silt loam, silty clay loam, clay loam, or loam.

Clarksville Series

The Clarksville series consists of very deep, somewhat excessively drained, moderately permeable soils on upland summits, backslopes, and shoulders. These soils formed in gravelly slope alluvium and the underlying gravelly residuum. Slopes range from 8 to 35 percent.

Soils of the Clarksville series are loamy-skeletal, siliceous, active, mesic Typic Paleudults.

Typical pedon of Clarksville very gravelly silt loam, 8 to 15 percent slopes; 600 feet east and 150 feet south of the northwest corner of sec. 32, T. 35 N., R. 16 W.; USGS Lebanon topographic quadrangle; latitude 37 degrees 43 minutes 58 seconds N.; longitude 92 degrees 43 minutes 41 seconds W.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) very gravelly silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; common fine and few medium roots; 45 percent chert gravel; slightly acid; clear smooth boundary.

E—5 to 17 inches; brown (10YR 5/3) extremely gravelly silt loam; weak fine granular structure; friable; many fine and few medium roots; 70 percent chert gravel; slightly acid; gradual smooth boundary.

Bt1—17 to 28 inches; strong brown (7.5YR 4/6) very gravelly silt loam; weak medium subangular blocky structure; firm; common fine roots; common distinct brown (10YR 5/3) continuous silt coats and few faint discontinuous clay films on faces of peds; 45 percent chert gravel; moderately acid; clear smooth boundary.

Bt2—28 to 40 inches; dark red (2.5YR 3/6) and pale brown (10YR 6/3) very gravelly silty clay loam; weak fine subangular blocky structure; firm; common fine roots; common distinct discontinuous clay films on faces of peds; 40 percent chert gravel and 15 percent chert cobbles; very strongly acid; clear smooth boundary.

2Bt3—40 to 80 inches; dark red (2.5YR 3/6) very gravelly clay; weak fine subangular blocky structure; firm; few fine roots; many distinct continuous clay films on faces of peds; 30 percent chert gravel and 10 percent chert cobbles; very strongly acid.

Coarse fragment content ranges from 35 to 60 percent in the A horizon, 35 to 75 percent in the E horizon, 35 to 80 percent in the Bt horizon, and 15 to 70 percent in the 2Bt horizon.

The A horizon has value of 3 or 4 and chroma of 2 or 3. The E horizon has value of 4, 5, or 6 and chroma of 3 or 4. The 2Bt horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3 to 6, and chroma of 4 or 6. Texture is the gravelly, very gravelly, or extremely gravelly analogues of silty clay or clay.

Creldon Series

The Creldon series consists of very deep, moderately well drained soils on upland summits. These soils have a fragipan. They formed in silty loess and the underlying gravelly residuum. Permeability is moderately slow above the fragipan, very slow in the fragipan, and slow below the fragipan. Slopes range from 1 to 3 percent.

Soils of the Creldon series are fine, mixed, active, mesic Oxyaquic Fragiudalfs.

Typical pedon of Creldon silt loam, 1 to 3 percent

slopes; 1,800 feet east and 1,800 feet north of the southwest corner of sec. 29, T. 33 N., R. 17 W.; USGS Phillipsburg topographic quadrangle; latitude 37 degrees 32 minutes 48 seconds N.; longitude 92 degrees 49 minutes 36 seconds W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; common fine roots; 2 percent chert gravel; very strongly acid; clear smooth boundary.

E—8 to 12 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; common fine and medium roots; 2 percent chert gravel; very strongly acid; clear smooth boundary.

Bt1—12 to 15 inches; brown (10YR 4/3) silty clay loam; common fine prominent red (2.5YR 4/6) mottles; moderate fine subangular blocky structure; firm; common fine and medium roots; common distinct discontinuous clay films on faces of peds; 5 percent chert gravel; very strongly acid; clear smooth boundary.

Bt2—15 to 23 inches; dark grayish brown (10YR 4/2) silty clay; common fine and medium prominent red (2.5YR 4/6) masses of iron accumulation; weak fine subangular blocky structure; firm; common fine roots; many distinct continuous clay films on faces of peds; 5 percent chert gravel; very strongly acid; gradual smooth boundary.

Bt3—23 to 32 inches; yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) silty clay loam; few medium prominent red (2.5YR 4/6) and common brown to dark brown (7.5YR 4/4) masses of iron accumulation; weak medium subangular blocky structure; firm; common fine roots; many distinct continuous clay films on faces of peds; 10 percent chert gravel; very strongly acid; gradual smooth boundary.

2Btx1—32 to 41 inches; gray (10YR 5/1) and yellowish brown (10YR 5/6) extremely gravelly silty clay loam; common medium prominent strong brown (7.5YR 4/6) masses of iron accumulation; moderate coarse prismatic structure; very firm, brittle; few very fine roots in mat at top of horizon and between the vertical faces of prisms; common prominent continuous clay films on vertical faces of prisms; common medium black (N 2/0) weakly cemented manganese concretions; 70 percent chert gravel; strongly acid; gradual smooth boundary.

3Btx2—41 to 62 inches; gray (10YR 5/1) and brown (7.5YR 5/4) extremely gravelly silty clay loam; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation; moderate

coarse prismatic structure; very firm, brittle; few very fine roots between vertical faces of prisms; few prominent continuous clay films on vertical faces of prisms; common medium black (N 2/0) weakly cemented manganese concretions; 75 percent chert gravel; strongly acid.

4Bt—62 to 80 inches; red (2.5YR 4/6) very gravelly clay; common coarse prominent gray (10YR 6/1) iron depletions; moderate very fine and fine subangular blocky structure; firm; common prominent discontinuous clay films on faces of peds and rock fragments; 30 percent chert gravel and 20 percent chert cobbles; very strongly acid.

The depth to the fragipan ranges from 24 to 33 inches. Coarse fragment content ranges from 0 to 10 percent above the fragipan and 10 to 75 percent in the fragipan and below the fragipan.

The Ap horizon has chroma of 2 or 3. The E horizon has value of 4 or 5 and chroma of 3 or 4. The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 3, 4, or 5, and chroma of 2, 3, 4, or 6. The Btx horizons have hue of 2.5YR to 10YR and value of 4, 5, or 6. Texture is silt loam, silty clay loam, or the gravelly, very gravelly, or extremely gravelly analogues of these textures.

Dapue Series

The Dapue series consists of very deep, well drained, moderately permeable soils on flood plains. These soils formed in silty alluvium. Slopes range from 0 to 3 percent.

Soils of the Dapue series are fine-silty, mixed, active, mesic Fluventic Hapludolls.

Typical pedon of Dapue silt loam, 0 to 3 percent slopes, occasionally flooded; 2,190 feet west and 200 feet north of the southeast corner of sec. 27, T. 34 N., R. 15 W.; USGS Russ topographic quadrangle; latitude 37 degrees 37 minutes 22 seconds N.; longitude 92 degrees 34 minutes 01 second W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; weak fine granular structure; friable; common fine roots; moderately acid; clear smooth boundary.

A—9 to 15 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; friable; common fine roots; moderately acid; clear smooth boundary.

Bw1—15 to 22 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine subangular blocky structure; friable; common fine roots; many faint dark brown

(10YR 3/3) continuous organic coats on faces of peds; moderately acid; clear smooth boundary.

Bw2—22 to 35 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine subangular blocky structure; friable; common fine roots; few faint dark brown (10YR 3/3) continuous organic coats on faces of peds; moderately acid; clear smooth boundary.

Bw3—35 to 49 inches; brown (7.5YR 4/3) silt loam; weak fine subangular blocky structure; friable; few fine roots; few faint dark brown (10YR 3/3) continuous organic coats on faces of peds and in pores; moderately acid; clear smooth boundary.

Bw4—49 to 80 inches; brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; firm; slightly acid.

The mollic epipedon ranges from 10 to 22 inches thick. Coarse fragment content ranges from 0 to 5 percent in the A and Bw horizons.

The A horizon has value of 2 or 3. The Bw horizon has value of 4 or 5.

Gasconade Series

The Gasconade series consists of shallow and very shallow, somewhat excessively drained, moderately slowly permeable soils on uplands, backslopes, and bluffs. These soils formed in gravelly residuum. Slopes range from 3 to 50 percent.

Soils of the Gasconade series are clayey-skeletal, mixed, superactive, mesic Lithic Hapludolls.

Typical pedon of Gasconade very gravelly silty clay loam, in an area of Gasconade-Gatewood-Rock outcrop complex, 3 to 15 percent slopes; 125 feet north and 500 feet west of the southeast corner of sec. 26, T. 33 N., R. 17 W.; USGS Phillipsburg topographic quadrangle; latitude 37 degrees 32 minutes 27 seconds N.; longitude 92 degrees 45 minutes 42 seconds W.

A—0 to 3 inches: black (10YR 2/1) very gravelly silty clay loam, very dark gray (10YR 3/1) dry; moderate fine granular structure; friable; many fine roots; 40 percent chert gravel; neutral; clear smooth boundary.

Bw1—3 to 6 inches; very dark brown (10YR 2/2) very gravelly clay, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; firm; few fine, medium, and coarse roots; 45 percent chert gravel; neutral; clear smooth boundary.

Bw2—6 to 12 inches; very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) very gravelly clay, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; firm; few medium roots; 50

percent chert gravel; slightly acid; abrupt smooth boundary.

2R—12 inches; dolostone bedrock.

The depth to bedrock ranges from 4 to 20 inches. Coarse fragment content ranges from 35 to 60 percent in the A horizon and 35 to 70 percent in the Bw horizon.

The A horizon has value of 2 or 3 and chroma 1, 2, or 3. The Bw horizon has hue of 7.5YR or 10YR and chroma of 1, 2, or 3. Texture is the very gravelly or extremely gravelly analogues of silty clay loam, clay loam, silty clay, or clay.

Gatewood Series

The Gatewood series consists of moderately deep, moderately well drained, slowly permeable soils on upland summits, shoulders, and backslopes. These soils formed in gravelly slope alluvium and the underlying clayey residuum. Slopes range from 3 to 35 percent.

Soils of the Gatewood series are very-fine, mixed, active, mesic Oxyaquic Hapludalfs.

Typical pedon of Gatewood very gravelly silt loam, in an area of Gatewood-Ocie complex, 8 to 15 percent slopes; 750 feet north and 1,550 feet west of the southeast corner of sec. 33, T. 35 N., R. 15 W.; USGS Oakland topographic quadrangle; latitude 37 degrees 43 minutes 09 seconds N.; longitude 92 degrees 35 minutes 06 seconds W.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) very gravelly silt loam, gray (10YR 5/1) dry; weak fine granular structure; friable; many fine and medium and few coarse roots; 55 percent chert gravel; moderately acid; clear smooth boundary.

E—5 to 13 inches; yellowish brown (10YR 5/4) very gravelly silt loam; weak fine granular structure; friable; common fine and few medium roots; 55 percent chert gravel; slightly acid; abrupt smooth boundary.

2Bt1—13 to 21 inches; strong brown (7.5YR 5/6) gravelly clay; many medium prominent yellowish brown (10YR 5/4) mottles; weak fine subangular blocky structure; firm; common medium and few coarse roots; common distinct discontinuous clay films on faces of peds; 15 percent chert gravel; strongly acid; clear smooth boundary.

2Bt2—21 to 30 inches; brown (10YR 5/3) and yellowish brown (10YR 5/6) gravelly clay; moderate fine subangular blocky structure; firm; few coarse roots; common distinct continuous clay films on faces of

peds; 15 percent chert gravel; moderately acid; clear smooth boundary.

2BC—30 to 33 inches; pale brown (10YR 6/3) and yellowish brown (10YR 5/6) sandy clay loam; massive; slightly alkaline.

3R—33 inches; dolostone bedrock.

The depth to bedrock ranges from 20 to 38 inches. Coarse fragment content ranges from 15 to 85 percent in the A and E horizons and 0 to 35 percent in the 2Bt horizon.

The A horizon has value of 3 or 4 and chroma of 1, 2, or 3. The E horizon has value of 4, 5, or 6 and chroma of 2, 3, or 4. Texture of the A and E horizons is gravelly silt loam, very gravelly silt loam, or extremely gravelly silt loam. The 2Bt horizon has hue of 2.5YR to 10YR, value of 3 to 6, and chroma of 2, 3, 4, or 6. It is silty clay, clay, or the gravelly, cobbly, or very channery analogues of these textures.

Hartville Series

The Hartville series consists of very deep, somewhat poorly drained, slowly permeable soils on stream terraces. These soils formed in silty and clayey alluvium. Slopes range from 1 to 3 percent.

Soils of the Hartville series are fine, mixed, active, mesic Aquic Hapludalfs.

Typical pedon of Hartville silt loam, 1 to 3 percent slopes, rarely flooded; 2,500 feet west and 1,900 feet south of the northeast corner of sec. 23, T. 34 N., R. 13 W., USGS Brownfield topographic quadrangle; latitude 37 degrees 38 minutes 30 seconds N.; longitude 92 degrees 19 minutes 52 seconds W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; common fine and medium roots; few fine black (N 2/0) weakly cemented manganese concretions; 3 percent chert gravel; moderately acid; clear smooth boundary.

E—8 to 13 inches; pale brown (10YR 6/3) silt loam; few fine faint light brownish gray (10YR 6/2) iron depletions; weak fine granular and weak fine subangular blocky structure; firm; common fine and medium roots; few distinct dark brown (10YR 3/3) discontinuous organic coats on faces of peds; few fine black (N 2/0) weakly cemented manganese concretions; neutral; clear smooth boundary.

Bt1—13 to 18 inches; yellowish brown (10YR 5/4) silty clay loam; common fine and medium distinct grayish brown (10YR 5/2) iron depletions; weak fine subangular blocky structure; firm; common fine and medium roots; few faint discontinuous clay films

on faces of peds; few fine and medium soft masses of black (N 2/0) manganese concretions; strongly acid; clear smooth boundary.

Bt2—18 to 30 inches; yellowish brown (10YR 5/4) silty clay; many fine and medium distinct dark grayish brown (10YR 4/2) iron depletions; weak fine subangular blocky structure; firm; few fine roots; few distinct discontinuous silt coats and many prominent continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt3—30 to 40 inches; grayish brown (10YR 5/2) silty clay loam; many fine and medium prominent dark yellowish brown (10YR 4/6) masses of iron accumulation; weak fine and moderate fine subangular blocky structure; firm; few fine roots; many prominent continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

2Bt4—40 to 80 inches; light brownish gray (10YR 6/2) and grayish brown (10YR 5/2) silty clay loam; many fine and medium prominent yellowish brown (10YR 5/4) masses of iron accumulation; weak fine subangular blocky structure; firm; few fine roots; few faint patchy clay films on faces of peds; few fine black (N 2/0) weakly cemented manganese concretions; very strongly acid.

Coarse fragment content ranges from 0 to 10 percent in the solum.

The A horizon has value of 4 or 5 and chroma of 2 or 3. The E horizon has value of 5 or 6 and chroma of 2, 3, or 4. The Bt and 2Bt horizons have value of 4, 5, or 6 and chroma of 1, 2, 3, 4, or 6.

Kaintuck Series

The Kaintuck series consists of very deep, well drained, moderately rapidly permeable soils on flood plains. These soils formed in loamy and sandy alluvium. Slopes range from 0 to 3 percent.

Soils of the Kaintuck series are coarse-loamy, siliceous, superactive, nonacid, mesic Typic Udifluvents.

Typical pedon of Kaintuck loam, 0 to 3 percent slopes, frequently flooded; 1,200 feet east and 1,650 feet south of the northwest corner of sec. 23, T. 34 N., R. 13 W.; USGS Brownfield topographic quadrangle; latitude 37 degrees 38 minutes 37 seconds N.; longitude 92 degrees 20 minutes 14 seconds W.

Ap—0 to 7 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine and medium roots; moderately acid; abrupt smooth boundary.

AC—7 to 15 inches; weakly stratified dark brown

(10YR 3/3) fine sandy loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine and medium roots; 2 percent chert gravel; moderately acid; clear smooth boundary.

C1—15 to 23 inches; brown (10YR 4/3) loamy sand; massive; friable; few fine roots; 5 percent chert gravel; moderately acid; abrupt smooth boundary.

C2—23 to 34 inches; weakly stratified brown (10YR 4/3) loamy sand; massive; friable; few very fine and fine roots; 10 percent chert gravel; moderately acid; abrupt smooth boundary.

C3—34 to 48 inches; stratified brown (10YR 4/3) sandy loam; massive; friable; few very fine and fine roots; 2 percent chert gravel; moderately acid; clear smooth boundary.

C4—48 to 80 inches; dark yellowish brown (10YR 4/4) loam; massive; friable; 1 percent chert gravel; moderately acid.

Coarse fragment content ranges from 0 to 10 percent in the A horizon and 0 to 25 percent in the C horizon.

The A horizon has chroma of 2, 3, or 4. The C horizon has value of 4 or 5 and chroma of 3 or 4. It is silt loam, loam, loamy sand, fine sandy loam, sandy loam, or the gravelly analogues of these textures.

Lowassie Series

The Lowassie series consists of very deep, poorly drained, slowly permeable soils in sinkholes on upland summits. These soils formed in silty loess and silty and clayey slope alluvium. Slopes range from 0 to 3 percent.

Soils of the Lowassie series are fine, smectitic, mesic Vertic Epiaquults.

Typical pedon of Lowassie silt loam, 0 to 3 percent slopes, frequently ponded; 1,480 feet south and 2,320 feet west of the northeast corner of sec. 33, T. 33 N., R. 17 W.; USGS Phillipsburg topographic quadrangle; latitude 37 degrees 32 minutes 14 seconds N.; longitude 92 degrees 48 minutes 15 seconds W.

Ap—0 to 2 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; many fine roots; 2 percent chert gravel; very strongly acid; clear wavy boundary.

BE—2 to 12 inches; pale brown (10YR 6/2) silt loam; common fine and medium faint very pale brown (10YR 7/2) iron depletions; weak fine granular structure; friable; few fine, medium, and coarse roots; 2 percent chert gravel; extremely acid; gradual smooth boundary.

Btg1—12 to 17 inches; grayish brown (10YR 5/2) silty clay loam; moderate medium subangular blocky structure; friable; few fine and medium roots; many distinct continuous light gray (10YR 7/2) silt coats and few distinct discontinuous clay films on faces of peds; 5 percent chert gravel; very strongly acid; clear smooth boundary.

Btg2—17 to 34 inches; dark grayish brown (10YR 4/2) clay; common fine distinct dark yellowish brown (10YR 4/6) masses of iron accumulation; weak fine subangular blocky structure; very firm; few fine roots; common distinct discontinuous clay films on faces of peds; 8 percent chert gravel; very strongly acid; clear smooth boundary.

2Btg3—34 to 44 inches; grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/6) very gravelly silty clay; moderate fine prismatic structure parting to weak very fine subangular blocky; very firm; few fine roots between prisms; many prominent continuous clay films on vertical faces of prisms; 45 percent chert gravel; very strongly acid; gradual smooth boundary.

2Btg4—44 to 80 inches; mixed grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/6) very gravelly silty clay; moderate fine prismatic structure parting to weak very fine subangular blocky; very firm; few fine roots between prisms; many prominent continuous clay films on vertical faces of prisms; 55 percent chert gravel; very strongly acid.

Coarse fragment content ranges from 0 to 10 percent in the Ap, BE, and Btg horizons and from 25 to 55 percent in the 2Btg horizon.

The A or Ap horizon has value of 3, 4, or 5 and chroma of 2 or 3. The BE horizon has value of 5, 6, or 7 and chroma of 1 or 2. Texture of the 2Btg horizon is the gravelly or very gravelly analogues of silty clay loam, silty clay, or clay.

Mano Series

The Mano series consists of very deep, moderately well drained, slowly permeable soils on uplands. These soils formed in gravelly slope alluvium over clayey residuum. Slopes range from 1 to 15 percent.

Soils of the Mano series are loamy-skeletal over clayey, mixed, semiactive, mesic Oxyaquic Hapludalfs.

Typical pedon of Mano gravelly silt loam, in an area of Mano-Ocie complex, 1 to 8 percent slopes; 2,640 feet west and 2,840 feet north of the southeast corner of sec. 19, T. 34 N., R. 12 W.; USGS Brownfield topographic quadrangle; latitude 37 degrees 38 minutes

28 seconds N.; longitude 92 degrees 17 minutes 43 seconds W.

A—0 to 3 inches; brown (10YR 4/3) gravelly silt loam, light brownish gray (10YR 6/2) dry; weak very fine granular structure; very friable; many fine and common medium roots; 30 percent chert gravel; extremely acid; abrupt smooth boundary.

E—3 to 11 inches; yellowish brown (10YR 5/4) very gravelly silt loam; moderate very fine subangular blocky structure; firm; common fine and few medium roots; common distinct discontinuous clay films on faces of peds; 40 percent chert gravel; very strongly acid; clear smooth boundary.

Bt1—11 to 20 inches; yellowish brown (10YR 5/4) very gravelly silt loam; moderate fine angular and weak very fine subangular blocky structure; firm; common fine and few medium roots; common distinct discontinuous clay films on faces of peds; 50 percent chert gravel; very strongly acid; abrupt wavy boundary.

2Bt2—20 to 38 inches; yellowish brown (10YR 5/6) clay; common fine distinct brown (10YR 5/3) mottles; weak coarse subangular blocky structure; very firm; few fine roots; many distinct discontinuous clay films on faces of peds; extremely acid; clear smooth boundary.

2Bt3—38 to 53 inches; yellowish brown (10YR 5/6) and strong brown (7.5YR 4/6) clay; common fine and medium distinct light brownish gray (10YR 6/2) iron depletions; weak coarse subangular blocky structure; very firm; few fine roots between peds; many distinct discontinuous clay films on faces of peds; very strongly acid; abrupt wavy boundary.

2Bt4—53 to 80 inches; strong brown (7.5YR 5/8) and brownish yellow (10YR 6/6) clay; common fine prominent red (2.5YR 4/6) mottles; weak coarse subangular blocky structure; very firm; many prominent discontinuous clay films on faces of peds; 10 percent weathered dolostone and chert gravel; extremely acid.

Coarse fragment content ranges from 30 to 75 percent in the A, E, and Bt horizons and 0 to 30 percent in the 2Bt horizon.

The A horizon has value of 3, 4, or 5 and chroma of 2 or 3. It is gravelly silt loam or extremely gravelly silt loam. The E horizon has value of 5 or 6 and chroma of 2, 3, or 4. Texture is gravelly silt loam, very gravelly silt loam, or extremely gravelly silt loam. The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 3 to 6 and chroma of 3, 4, or 6. Texture is the gravelly, very gravelly, or extremely gravelly analogues of silt loam or silty clay loam. The 2Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 4, 5, or 6, and chroma of 3,

4, 6, or 8. It is clay, silty clay, or the gravelly analogues of these textures.

Moko Series

The Moko series consists of shallow, somewhat excessively drained, moderately permeable soils on uplands. These soils formed in gravelly colluvium. Slopes range from 50 to 80 percent.

Soils of the Moko series are loamy-skeletal, mixed, superactive, mesic Lithic Hapludolls.

Typical pedon of Moko very gravelly loam, 50 to 80 percent slopes; 300 feet west and 1,000 feet south of the northeast corner of sec. 35, T. 33 N., R. 15 W.; USGS Russ topographic quadrangle; latitude 37 degrees 31 minutes 58 seconds N.; longitude 92 degrees 32 minutes 23 seconds W.

A—0 to 10 inches; very dark brown (10YR 2/2) very gravelly loam, very dark grayish brown (10YR 3/2) dry; moderate fine granular structure; friable; many fine, common medium, and few coarse roots; 40 percent chert gravel and 10 percent chert cobbles; neutral; abrupt smooth boundary.

R—10 inches; dolostone bedrock.

The depth to bedrock ranges from 4 to 20 inches. Coarse fragment content ranges from 35 to 60 percent in the A horizon.

The A horizon has value of 2 or 3 and chroma of 1, 2, or 3.

Moniteau Series

The Moniteau series consists of very deep, poorly drained, moderately slowly permeable soils on high flood plains. These soils formed in silty alluvium. Slopes range from 0 to 2 percent.

Soils of the Moniteau series are fine-silty, mixed, superactive, mesic Typic Endoaqualfs.

Typical pedon of Moniteau silt loam, 0 to 2 percent slopes, occasionally flooded; 750 feet east and 20 feet south of the northwest corner of sec. 10 T. 33 N., R. 13 W.; USGS Winnipeg topographic quadrangle; latitude 37 degrees 35 minutes 24 seconds N.; longitude 92 degrees 21 minutes 27 seconds W.

Ap1—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine and very fine granular structure; friable; many fine roots; moderately acid; abrupt smooth boundary.

Ap2—3 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular and weak fine subangular

blocky structure; friable; common fine roots; few fine black manganese concretions; moderately acid; clear smooth boundary.

E—8 to 22 inches; light brownish gray (10YR 6/2) silt loam; few fine prominent dark yellowish brown (10YR 4/6) masses of iron accumulation; weak very fine granular structure; few fine roots; few fine black manganese concretions; slightly acid; clear smooth boundary.

Btg1—22 to 28 inches; grayish brown (10YR 5/2) silt loam; few fine distinct dark yellowish brown (10YR 4/6) masses of iron accumulation; weak fine subangular blocky structure; friable; few fine roots; few faint patchy clay films on faces of peds; few fine black (N 2/0) weakly cemented manganese concretions; slightly acid; clear smooth boundary.

Btg2—28 to 46 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine prominent dark yellowish brown (10YR 4/6) masses of iron accumulation; weak fine subangular blocky structure; firm; few fine roots; few distinct patchy clay films on faces of peds; few fine and medium black (N 2/0) weakly cemented manganese concretions; moderately acid; clear smooth boundary.

Btg3—46 to 80 inches; gray (10YR 5/1) silty clay loam; many medium prominent dark yellowish brown (10YR 4/6) masses of iron accumulation; weak fine subangular blocky structure; firm; few prominent clay films; few fine black (N 2/0) weakly cemented manganese concretions; moderately acid.

The A or Ap horizon has value of 4 or 5 and chroma of 1 or 2. The E horizon has value of 5, 6, or 7 and chroma of 1 or 2. The Btg horizon has hue of 10YR to 5Y and value of 4, 5, or 6.

Ocie Series

The Ocie series consists of deep, moderately well drained, slowly permeable soils on upland summits, shoulders, and backslopes. These soils formed in gravelly slope alluvium over clayey residuum. Slopes range from 1 to 35 percent.

Soils of the Ocie series are loamy-skeletal over clayey, mixed, semiactive, mesic Oxyaquic Hapludalfs.

Typical pedon of Ocie very gravelly silt loam, in an area of Gatewood-Ocie complex, 15 to 35 percent slopes; 2,100 feet south and 400 feet east of the northwest corner of sec. 9, T. 34 N., R. 13 W.; USGS Drynob topographic quadrangle; latitude 37 degrees 40 minutes 20 seconds N.; longitude 92 degrees 22 minutes 34 seconds W.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) very gravelly silt loam, light brownish gray (10YR 6/2) dry; common medium prominent dark yellowish brown (10YR 4/6) masses of iron accumulation; weak fine granular structure; friable; many fine and medium roots; 45 percent chert gravel; moderately acid; clear smooth boundary.

E—3 to 10 inches; brown (10YR 5/3) very gravelly silt loam; weak fine granular structure; friable; many fine and medium and few coarse roots; 60 percent chert gravel; very strongly acid; clear smooth boundary.

Bt1—10 to 17 inches; strong brown (7.5YR 5/6) very gravelly silt loam; weak fine subangular blocky structure; friable; common fine and medium roots; many distinct pale brown (10YR 6/3) continuous silt coats and very few faint discontinuous clay films on faces of peds; 50 percent chert gravel; very strongly acid; clear wavy boundary.

2Bt2—17 to 29 inches; strong brown (7.5YR 5/6) and yellowish brown (10YR 5/4) gravelly clay; weak fine subangular blocky structure; firm; common fine and medium roots; common prominent discontinuous clay films on faces of peds; 25 percent chert gravel; strongly acid; clear wavy boundary.

2Bt3—29 to 42 inches; strong brown (7.5YR 4/6) gravelly clay; common medium prominent red (10R 4/6) masses of iron accumulation; moderate fine subangular blocky structure; firm; few fine roots; common prominent continuous clay films on faces of peds; 15 percent chert gravel; strongly acid; clear wavy boundary.

2Bt4—42 to 53 inches; yellowish brown (10YR 5/6) and brown (10YR 5/3) gravelly clay; common medium prominent red (10R 4/6) masses of iron accumulation; weak fine subangular blocky structure; firm; few fine roots; few faint discontinuous clay films on faces of peds; 20 percent chert gravel; strongly acid.

3R—53 inches; dolostone bedrock.

The depth to bedrock ranges from 40 to 55 inches. Coarse fragment content ranges from 35 to 60 percent in the A, E, and Bt horizons and 0 to 35 percent in the 2Bt horizon.

The A horizon has value of 3, 4, or 5. The E horizon has value of 5 or 6 and chroma of 2, 3, or 4. The Bt horizon has hue of 2.5YR to 10YR, value of 3 to 6, and chroma of 3, 4, or 6. Texture is the very gravelly or extremely gravelly analogues of silt loam or silty clay loam. The 2Bt horizon has hue of 2.5YR to 10YR, value of 4, 5, or 6 and chroma of 3, 4, 6, or 8. It is clay, silty clay, or the gravelly analogues of these textures.

Plato Series

The Plato series consists of very deep, somewhat poorly drained soils on upland summits. These soils have a fragipan. They formed in silty loess over gravelly slope alluvium over clayey residuum. Permeability is moderately slow above the fragipan, very slow in the fragipan, and slow below the fragipan. Slopes range from 1 to 3 percent.

Soils of the Plato series are fine, mixed, active, mesic Aquic Fragiudalfs.

Typical pedon of Plato silt loam, 1 to 3 percent slopes; 1,050 feet south and 1,170 feet east of the northwest corner of sec. 23, T. 34 N., R. 16 W.; USGS Lebanon topographic quadrangle; latitude 37 degrees 39 minutes 07 seconds N.; longitude 92 degrees 39 minutes 49 seconds W.

A—0 to 7 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

Bt1—7 to 11 inches; strong brown (7.5YR 4/6) silty clay loam; few fine prominent grayish brown (10YR 5/2) iron depletions; weak very fine subangular blocky structure; friable; common fine roots; few fine distinct discontinuous clay films on faces of peds; very strongly acid; abrupt smooth boundary.

Bt2—11 to 15 inches; grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) silty clay loam; few fine prominent strong brown (7.5YR 4/6) masses of iron accumulation; moderate fine subangular blocky structure; firm; few fine roots; few fine distinct discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt3—15 to 21 inches; grayish brown (10YR 5/2), brown (10YR 5/3), and yellowish red (5YR 4/6) silty clay; moderate fine subangular blocky structure; firm; few fine roots; few fine distinct discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt4—21 to 25 inches; grayish brown (10YR 5/2) silty clay loam; common medium faint brown (10YR 5/3) and common medium prominent yellowish red (5YR 4/6) masses of iron accumulation; weak fine subangular blocky structure; firm; few fine roots; few fine distinct discontinuous clay films on faces of peds; very strongly acid; abrupt smooth boundary.

2Btx1—25 to 41 inches; grayish brown (10YR 5/2) and brown (10YR 5/3) silty clay loam; few fine prominent strong brown (7.5YR 5/6) masses of iron accumulation; moderate very coarse prismatic structure; very firm, brittle; few fine distinct

discontinuous clay films on faces of peds; 4 percent chert gravel; strongly acid; abrupt wavy boundary.

2Btx2—41 to 51 inches; yellowish red (5YR 5/6) extremely gravelly silty clay loam; common fine prominent brown (10YR 5/3) mottles; moderate very coarse prismatic structure parting to weak fine subangular blocky; very firm, brittle; few fine distinct discontinuous clay films on faces of peds; 55 percent chert gravel; strongly acid; gradual smooth boundary.

3Bt—51 to 80 inches; brown (10YR 5/3) and yellowish red (5YR 5/6) extremely gravelly clay loam; weak fine subangular blocky structure; very firm; few fine distinct discontinuous clay films on faces of peds; 65 percent chert gravel; moderately acid.

The depth to the fragipan ranges from 22 to 31 inches. Coarse fragment content ranges from 0 to 15 percent above the fragipan, 0 to 70 percent in the fragipan, and 15 to 85 percent below the fragipan.

The A or Ap horizon has value of 4 or 5 and chroma of 2 or 3. The E horizon, where present, has value of 5 or 6. The Bt horizon has value of 4, 5, or 6. The fragipan has value of 4 to 7. It is silt loam, silty clay loam, or the gravelly, very gravelly, or extremely gravelly analogues of these textures. The 3Bt horizon has hue of 2.5YR to 10YR and value of 4, 5, or 6. Texture is the gravelly, very gravelly, or extremely gravelly analogues of silty clay loam, clay loam, silty clay, or clay.

Pomme Series

The Pomme series consists of very deep, well drained, moderately permeable soils on strath terraces. These soils formed in loess over alluvium and colluvium from dolostone residuum. Slopes range from 3 to 8 percent.

Soils of the Pomme series are fine-loamy, mixed, semiactive, mesic Typic Paleudalfs.

Typical pedon of Pomme silt loam, 3 to 8 percent slopes; 1,000 feet south and 25 feet west of the northeast corner of sec. 23, T. 34 N., R. 13 W.; USGS Brownfield topographic quadrangle; latitude 37 degrees 38 minutes 43 seconds N.; longitude 92 degrees 19 minutes 22 seconds W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; moderate fine granular structure parting to moderate very fine granular; friable; many fine and medium roots; few fine rounded slightly hard iron-manganese concretions;

5 percent subangular chert gravel; neutral; abrupt smooth boundary.

Bt1—7 to 10 inches; yellowish brown (10YR 5/4) silt loam; weak very fine subangular blocky structure; friable; common fine roots; few distinct discontinuous brown (10YR 4/3) organic coats on faces of peds and in pores; few fine rounded soft iron-manganese concretions; 5 percent subangular chert gravel; neutral; clear smooth boundary.

Bt2—10 to 15 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable; common fine roots; few faint discontinuous brown (10YR 4/3) organic coats on faces of peds and in pores; few fine rounded soft iron-manganese concretions; 10 percent subangular chert gravel; neutral; clear smooth boundary.

Bt3—15 to 21 inches; yellowish brown (10YR 5/4) gravelly silty clay loam; moderate medium subangular blocky structure parting to moderate very fine and fine subangular blocky; friable; common fine roots between peds; common prominent discontinuous light yellowish brown (10YR 6/4) silt coats and common prominent continuous clay films on faces of peds; 10 percent subangular and 5 percent subrounded chert gravel; moderately acid; clear smooth boundary.

Bt4—21 to 25 inches; light yellowish brown (10YR 6/4), red (2.5YR 4/6) and brown (7.5YR 4/4) silty clay loam; moderate very fine and fine subangular blocky structure; firm; few fine roots; few distinct discontinuous light brownish gray (10YR 6/2) silt coats and many prominent continuous clay films on faces of peds; 10 percent subrounded chert gravel; strongly acid; abrupt smooth boundary.

2Bt5—25 to 33 inches; yellowish brown (10YR 5/4) and dark red (2.5YR 3/6) silty clay; moderate fine subangular blocky structure; firm; common fine roots; few prominent patchy very dark grayish brown (10YR 3/2) organic coats and many prominent clay films on faces of peds; 5 percent subangular and 5 percent subrounded chert gravel; strongly acid; clear smooth boundary.

2Bt6—33 to 44 inches; dark red (2.5YR 3/6) and yellowish brown (10YR 5/6) clay; weak fine and very fine subangular blocky structure; firm; few fine roots; few prominent discontinuous light brownish gray (10YR 6/2) silt coats and common prominent clay films on faces of peds; 10 percent subangular chert gravel; very strongly acid; clear smooth boundary.

2Bt7—44 to 55 inches; red (2.5YR 4/8) and strong brown (7.5YR 5/6) gravelly clay loam; common fine and medium prominent light brownish gray (10YR 6/2) iron depletions; weak fine subangular blocky

structure; firm; few fine roots; common distinct discontinuous clay films on faces of peds; 10 percent subangular and 10 percent subrounded chert gravel; very strongly acid; abrupt smooth boundary.

3Bt8—55 to 80 inches; red (2.5YR 4/6) and strong brown (7.5YR 5/6) very gravelly sandy clay loam; common fine and medium prominent grayish brown (10YR 5/2) irregular iron depletions; weak fine subangular blocky structure; firm; few fine roots; common distinct discontinuous clay films on faces of peds; 45 percent subangular chert gravel; very strongly acid.

Coarse fragment content ranges from 0 to 15 percent in the Ap horizon and E horizon (where present), 10 to 35 percent in the Bt and 2Bt horizons, and 20 to 85 percent in the 3Bt horizon.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2, 3, or 4. The Bt and 2Bt horizons have hue of 5YR, 7.5YR, or 10YR, value of 3, 4, or 5, and chroma of 4, 6, or 8. Texture of the Bt and 2Bt horizons is silt loam, silty clay loam, or the gravelly analogues of these textures. Texture of the 3Bt horizon is the gravelly, very gravelly, or extremely gravelly analogues of silt loam or silty clay.

Poynor Series

The Poynor series consists of very deep, well drained, moderately permeable soils on upland backslopes, summits, and shoulders. These soils formed in gravelly slope alluvium over clayey residuum. Slopes range from 1 to 50 percent.

Soils of the Poynor series are loamy-skeletal over clayey, siliceous, semiactive, mesic Typic Paleudults.

Typical pedon of Poynor very gravelly silt loam, 8 to 15 percent slopes; 2,000 feet east and 1,700 feet south of the northwest corner of sec. 13, T. 32 N., R. 13 W.; USGS Manes topographic quadrangle; latitude 37 degrees 29 minutes 00 seconds N.; longitude 92 degrees 19 minutes 03 seconds W.

A—0 to 2 inches; dark grayish brown (10YR 4/2) very gravelly silt loam, light gray (10YR 7/2) dry; weak fine granular structure; friable; many fine, medium, and coarse roots; 55 percent chert gravel; strongly acid; clear smooth boundary.

E—2 to 7 inches; light yellowish brown (10YR 6/4) very gravelly silt loam; weak fine granular structure; friable; many fine, medium, and coarse roots; 50 percent chert gravel; very strongly acid; clear smooth boundary.

Bt1—7 to 22 inches; yellowish red (5YR 5/6) and pale

brown (10YR 6/3) very gravelly silt loam; moderate fine subangular blocky structure; friable; few fine, medium, and coarse roots; very few light gray (10YR 7/2) distinct discontinuous silt coats and few faint patchy clay films on faces of peds; 35 percent chert gravel and 5 percent chert cobbles; very strongly acid; abrupt smooth boundary.

2Bt2—22 to 32 inches; red (2.5YR 4/6) clay; moderate fine subangular blocky structure; firm; few fine, medium, and coarse roots; common light brown (7.5YR 6/4) prominent continuous silt coats and common distinct continuous clay films on faces of peds and in pores; 5 percent chert gravel; very strongly acid; gradual smooth boundary.

2Bt3—32 to 43 inches; red (2.5YR 4/6) clay; weak fine subangular blocky structure; firm; few fine and medium roots; common pale brown (10YR 6/3) prominent discontinuous silt coats and many continuous prominent clay films on faces of peds; 5 percent gravel; very strongly acid; gradual smooth boundary.

2Bt4—43 to 53 inches; red (2.5YR 4/6) cobbly clay; common fine distinct dark yellowish brown (10YR 4/6) and few red (10R 4/6) mottles; weak fine subangular blocky structure; firm; many prominent continuous clay films on faces of peds; 5 percent chert gravel and 25 percent chert cobbles; very strongly acid; clear smooth boundary.

2Bt5—53 to 80 inches; red (2.5YR 4/6) clay; few medium prominent reddish yellow (7.5YR 6/6) mottles; weak fine subangular blocky structure; firm; many prominent continuous clay films on faces of peds and in pores; 10 percent weathered chert gravel; very strongly acid.

Coarse fragment content ranges from 35 to 55 percent in the A, E, and Bt horizons and 0 to 35 percent in the 2Bt horizon.

The A horizon has value from 3, 4, or 5 and chroma of 2 or 3. The E horizon has value of 5 or 6 and chroma of 2, 3, or 4. The Bt horizon has value of 4, 5, or 6, and chroma of 4 or 6. Texture is the very gravelly or extremely gravelly analogues of silt loam or silty clay loam. The 2Bt horizon has hue of 2.5YR to 10YR, value of 3, 4, or 5 and chroma 4, 6, or 8. It is clay, silty clay, or the gravelly or cobbly analogues of these textures.

Racket Series

The Racket series consists of very deep, well drained, moderately permeable soils on flood plains. These soils formed in loamy alluvium. Slopes range from 0 to 3 percent.

Soils of the Racket series are fine-loamy, mixed, superactive, mesic Cumulic Hapludolls.

Typical pedon of Racket silt loam, 0 to 3 percent slopes, frequently flooded; 2,150 feet east and 1,300 feet south of the northwest corner of sec. 23, T. 34 N., R. 13 W.; USGS Brownfield topographic quadrangle; latitude 37 degrees 38 minutes 40 seconds N.; longitude 92 degrees 20 minutes 01 second W.

- Ap—0 to 7 inches; dark brown (10YR 3/3) silt loam, grayish brown (10YR 5/2) dry; weak and moderate fine and medium granular structure; friable; many fine and medium roots; slightly acid; abrupt smooth boundary.
- A1—7 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; weak fine granular structure; friable; many fine and medium roots; slightly acid; clear smooth boundary.
- A2—12 to 32 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; few fine roots; slightly acid; gradual smooth boundary.
- A3—32 to 46 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; friable; few fine roots; slightly acid; gradual smooth boundary.
- Bw—46 to 58 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; slightly acid.
- 2C—58 to 80 inches; dark yellowish brown (10YR 4/4) very gravelly loamy sand; massive; friable; 55 percent chert gravel; moderately acid.

Coarse fragment content ranges from 0 to 10 percent in the Ap and A horizons, 0 to 30 percent in the Bw horizon, and 0 to 70 percent in the 2C horizon. Thickness of the mollic epipedon ranges from 24 to 48 inches.

The Ap and A horizons have value of 2 or 3. The Bw horizon has chroma of 2 or 3. It is silt loam, loam, or the gravelly analogues of these textures. The 2C horizon has value of 4 or 5 and chroma of 3 or 4. It is stratified fine sandy loam to coarse sand or the gravelly, very gravelly, or extremely gravelly analogues of these textures.

Rueter Series

The Rueter series consists of very deep, somewhat excessively drained, moderately permeable soils on upland backslopes. These soils formed in colluvium from gravelly slope alluvium and the underlying clayey residuum. Slopes range from 15 to 60 percent.

Soils of the Rueter series are loamy-skeletal, siliceous, active, mesic Typic Paleudalfs.

Typical pedon of Rueter extremely gravelly silt loam, in an area of Rueter-Bardley complex, 15 to 60 percent slopes; 2,100 feet east and 800 feet south of the northwest corner of sec. 7, T. 35 N., R. 17 W.; USGS Eldridge West topographic quadrangle; latitude 37 degrees 47 minutes 29 seconds N.; longitude 92 degrees 51 minutes 00 seconds W.

- A—0 to 3 inches; brown (10YR 5/3) extremely gravelly silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; many fine roots; 80 percent chert gravel; strongly acid; clear smooth boundary.
- E1—3 to 14 inches; pale brown (10YR 6/3) extremely gravelly loam; moderate fine granular structure; friable; many fine roots; 65 percent chert gravel and 15 percent chert cobbles; strongly acid; gradual smooth boundary.
- E2—14 to 24 inches; very pale brown (10YR 7/4) extremely gravelly silt loam; weak fine subangular blocky structure; friable; common fine and coarse roots; 70 percent chert gravel and 10 percent chert cobbles; moderately acid; abrupt smooth boundary.
- Bt1—24 to 34 inches; strong brown (7.5YR 5/6) extremely cobbly silt loam; weak fine subangular blocky structure; firm; few fine roots; common distinct discontinuous clay films on faces of peds; 40 percent chert gravel and 35 percent chert cobbles; moderately acid; gradual smooth boundary.
- Bt2—34 to 45 inches; reddish yellow (7.5YR 6/6) extremely cobbly silt loam; weak fine subangular blocky structure; firm; few fine roots; common prominent discontinuous clay films on lower surfaces of peds; 25 percent chert gravel and 50 percent chert cobbles; moderately acid; clear smooth boundary.
- Bt3—45 to 59 inches; strong brown (7.5YR 5/6) extremely cobbly silt loam; weak fine subangular blocky structure; firm; few fine roots; common distinct discontinuous clay films on lower surfaces of peds; 25 percent chert gravel, 30 percent chert cobbles, and 15 percent chert stones; moderately acid; clear smooth boundary.
- 2Bt4—59 to 80 inches; yellowish red (5YR 5/8) cobbly clay; moderate fine subangular blocky structure; firm; few fine roots; many prominent continuous clay films on faces of peds; 15 percent chert gravel and 15 percent chert cobbles; strongly acid.

Coarse fragment content ranges from 60 to 80 percent in the A and E horizons, 35 to 85 percent in the Bt horizon, and 10 to 60 percent in the 2Bt horizon.

The A horizon has value of 3, 4, or 5 and chroma of 2 or 3. The E horizon has value of 5, 6, or 7 and chroma of 3 or 4. The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 4, 5, or 6, and chroma of 4 or 6. Texture is the very gravelly, very cobbly, extremely gravelly, or extremely cobbly analogues of silt loam or silty clay loam. The 2Bt horizon has hue of 2.5YR to 10YR, value of 3 to 6, and chroma of 1, 2, 3, 4, 6, or 8. It is silty clay, clay, or the gravelly, very gravelly, cobbly, or very cobbly analogues of these textures.

Tanglenook Series

The Tanglenook series consists of very deep, poorly drained, slowly permeable soils on terraces. These soils formed in silty slope colluvium over silty and clayey alluvium. Slopes range from 0 to 3 percent.

Soils of the Tanglenook series are fine, mixed, superactive, mesic Typic Argiaquolls.

Typical pedon of Tanglenook silt loam, 0 to 3 percent slopes; 2,400 feet west and 1,100 feet north of the southeast corner of sec. 26, T. 33 N., R. 17 W.; USGS Phillipsburg topographic quadrangle; latitude 37 degrees 32 minutes 36 seconds N.; longitude 92 degrees 46 minutes 05 seconds W.

Ap—0 to 6 inches; very dark brown (10YR 2/2) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; many fine and few medium roots; few fine black (N 2/0) weakly cemented manganese concretions; moderately acid; clear smooth boundary.

A1—6 to 11 inches; very dark brown (10YR 2/2) silty clay loam, dark gray (10YR 4/1) dry; weak fine granular structure; firm; many fine and few medium roots; few fine black (N 2/0) weakly cemented manganese concretions; moderately acid; clear smooth boundary.

A2—11 to 19 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; firm; few fine roots; few fine black (N 2/0) weakly cemented manganese concretions; slightly acid; clear smooth boundary.

Bt1—19 to 30 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; few fine prominent brown (7.5YR 4/4) masses of iron accumulation; moderate fine subangular blocky structure; firm; few fine roots; many prominent continuous clay films on faces of peds; common fine black (N 2/0) weakly cemented manganese concretions; slightly acid; clear smooth boundary.

Btg1—30 to 39 inches; dark grayish brown (10YR 4/2) clay; few fine prominent brown (7.5YR 4/4) masses

of iron accumulation; weak fine subangular blocky structure; firm; few fine roots; many prominent continuous clay films on faces of peds; neutral; gradual smooth boundary.

Btg2—39 to 55 inches; dark gray (10YR 4/1) silty clay; few medium brown (7.5YR 4/4) masses of iron accumulation; weak fine subangular blocky structure; firm; few fine roots; common distinct discontinuous clay films on faces of peds; common fine irregular masses of iron accumulation and manganese concretions; slightly alkaline; gradual smooth boundary.

Btg3—55 to 80 inches; dark gray (10YR 4/1) silty clay; few medium and coarse prominent strong brown (7.5YR 4/6) masses of iron accumulation; weak fine subangular blocky structure; firm; few fine roots; few distinct discontinuous clay films on faces of peds; common fine black (N 2/0) weakly cemented manganese concretions; slightly alkaline.

The mollic epipedon is 20 to 36 inches thick.

The Bt horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2. The Btg horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. The Cg horizon, where present, has hue of 10YR or 2.5Y, value of 4, 5, or 6, and chroma of 1 or 2.

Tonti Series

The Tonti series consists of very deep, moderately well drained soils on uplands. These soils have a fragipan. They formed in a thin mantle of silty loess over gravelly slope alluvium over clayey residuum. Permeability is moderate above the fragipan, very slow in the fragipan, and slow below the fragipan. Slopes range from 3 to 8 percent.

Soils of the Tonti series are fine-loamy, mixed, active, mesic Typic Fragiudults.

Typical pedon of Tonti silt loam, 3 to 8 percent slopes; 1,600 feet west and 2,600 feet north of the southeast corner of sec. 13, T. 32 N., R. 13 W.; USGS Manes topographic quadrangle; latitude 37 degrees 28 minutes 48 seconds N.; longitude 92 degrees 18 minutes 48 seconds W.

A—0 to 3 inches; very dark gray (10YR 3/1) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular and subangular blocky structure; very friable; many fine and medium roots; 10 percent chert gravel; strongly acid; clear wavy boundary.

EB—3 to 7 inches; brown (10YR 5/3) and dark brown (7.5YR 4/4) gravelly silt loam; weak fine subangular blocky structure; very friable; many fine

and medium roots; 15 percent chert gravel; extremely acid; clear wavy boundary.

Bt1—7 to 18 inches; brown (7.5YR 4/4) gravelly silty clay loam; weak fine subangular blocky structure; friable; many fine and medium roots; common faint discontinuous clay films on faces of peds; common fine black (N 2/0) weakly cemented manganese concretions; 20 percent chert gravel; very strongly acid; abrupt wavy boundary.

2Btx—18 to 29 inches; yellowish brown (10YR 5/4) and light yellowish brown (10YR 6/4) very gravelly silt loam; moderate coarse and very coarse prismatic structure parting to weak very fine subangular blocky; brittle; very firm; few fine roots in mat at top of horizon and between vertical faces of prisms; common distinct discontinuous clay films on vertical faces of prisms; 55 percent chert gravel; very strongly acid; abrupt wavy boundary.

3Bt1—29 to 45 inches; red (2.5YR 4/6) very gravelly clay; common fine and medium grayish brown (10YR 5/2) iron depletions; weak fine angular and subangular blocky structure; firm; few very fine roots continuing below the vertical joints between prisms in above horizon; few prominent pale brown (10YR 6/3) discontinuous silt coats, many distinct continuous clay films, and few prominent discontinuous organic coats on faces of peds; 42 percent chert gravel and 3 percent chert cobbles; very strongly acid; clear wavy boundary.

3Bt2—45 to 80 inches; red (10R 4/6), yellowish red (5YR 5/8), and brown (7.5YR 4/4) very gravelly silty clay; common fine and medium gray (10YR 5/1) iron depletions; weak fine angular blocky structure; firm; few very fine roots; many distinct continuous clay films on faces of peds; 45 percent chert gravel and 5 percent chert cobbles; extremely acid.

The depth to the fragipan ranges from 16 to 25 inches. Coarse fragment content ranges from 0 to 25 percent in the A and EB horizons, 10 to 35 percent in the Bt horizon above the fragipan, 25 to 60 percent in the 2Btx horizon, and 20 to 70 percent in the 3Bt horizon below the fragipan.

The A horizon has value of 3 or 4 and chroma of 1, 2, or 3. The E horizon, where present, has value of 4 or 5 and chroma of 3 or 4. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6. The 2Btx horizon has hue of 7.5YR or 10YR, value of 4, 5, or 6, and chroma of 4 or 6. Texture is the gravelly or very gravelly analogues of silt loam or silty clay loam. The 3Bt horizon has value of 3, 4, or 5, and chroma of 4, 6, or 8. It is silty clay, clay, or the

gravelly, very gravelly, or extremely gravelly analogues of these textures.

Viraton Series

The Viraton series consists of very deep, moderately well drained soils on upland summits. These soils have a fragipan. They formed in silty loess over gravelly slope alluvium over clayey residuum. Permeability is moderate above the fragipan, very slow in the fragipan, and moderately slow below the fragipan. Slopes range from 1 to 8 percent.

Soils of the Viraton series are fine-loamy, siliceous, active, mesic Oxyaquic Fragiudalfs.

Typical pedon of Viraton silt loam, 1 to 3 percent slopes; 1,000 feet west and 1,300 feet north of the southeast corner of sec. 21, T. 33 N., R. 17 W.; USGS Phillipsburg topographic quadrangle; latitude 37 degrees 33 minutes 32 seconds N.; longitude 92 degrees 48 minutes 00 seconds W.

Ap—0 to 5 inches; brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; weak fine granular structure; friable; many fine and medium roots; few fine black (N 2/0) weakly cemented manganese concretions; 5 percent chert gravel; moderately acid; abrupt smooth boundary.

E—5 to 11 inches; brown (7.5YR 5/4) silt loam; moderate fine granular structure; friable; common very fine and fine roots; few fine and medium black (N 2/0) weakly cemented manganese concretions; 5 percent chert gravel; slightly acid; clear smooth boundary.

Bt1—11 to 15 inches; strong brown (7.5YR 4/6) silty clay loam; weak very fine and fine subangular blocky structure; friable; common very fine and fine roots; few faint discontinuous clay films on faces of peds; few fine and medium black (N 2/0) weakly cemented manganese concretions; 5 percent chert gravel; moderately acid; clear smooth boundary.

Bt2—15 to 26 inches; yellowish red (5YR 4/6) silty clay loam; moderate fine subangular blocky structure; firm; common very fine and fine roots; common distinct continuous clay films on faces of peds; few fine black (N 2/0) weakly cemented manganese concretions; 10 percent chert gravel; strongly acid; abrupt smooth boundary.

2Btx1—26 to 41 inches; dark red (2.5YR 3/6), strong brown (7.5YR 4/6), and yellowish brown (10YR 5/4) very gravelly silty clay loam; moderate coarse and very coarse prismatic structure parting to weak very fine and fine subangular blocky; very firm, brittle; common very fine and fine roots in mat at top of horizon and between vertical faces of

prisms; common prominent continuous clay films on vertical faces of prisms; common medium and coarse black (N 2/0) weakly cemented manganese concretions; 50 percent chert gravel; strongly acid; clear smooth boundary.

2Btx2—41 to 54 inches; dark red (2.5YR 3/6), strong brown (7.5YR 4/6), and light brownish gray (10YR 6/2) extremely gravelly clay loam; moderate coarse and very coarse prismatic structure parting to weak very fine and fine subangular blocky; very firm, brittle; many prominent continuous clay films on vertical faces of prisms; 65 percent chert gravel and 5 percent chert cobbles; strongly acid; clear smooth boundary.

3Bt—54 to 80 inches; red (2.5YR 4/6) very gravelly clay; common coarse prominent gray (10YR 6/1) iron depletions; moderate very fine and fine subangular blocky structure; firm; common prominent discontinuous clay films on faces of peds and rock fragments; 30 percent chert gravel and 20 percent chert cobbles; very strongly acid.

The depth to the fragipan ranges from 18 to 33 inches. Coarse fragment content ranges from 0 to 15 percent in the Ap and E horizons and 5 to 35 percent in the Bt horizon above the fragipan, 20 to 75 percent in the fragipan, and 10 to 70 percent below the fragipan.

The A or Ap horizon has value of 3 or 4 and chroma of 2, 3, or 4. The E horizon has hue of 7.5YR or 10YR, value of 4, 5, or 6, and chroma of 2, 3, or 4. The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 4, 5, or 6, and chroma of 4 or 6. Texture of the 2Btx horizon is the gravelly, very gravelly, or extremely gravelly analogues of silt loam, silty clay loam, or clay loam. The 3Bt horizon has hue of 2.5YR to 10YR, value of 3 or 4, and chroma of 6 or 8. It is silty clay, clay, or the gravelly, very gravelly, or extremely gravelly analogues of these textures.

Wilderness Series

The Wilderness series consists of very deep, moderately well drained soils on upland summits. These soils have a fragipan. They formed in gravelly slope alluvium over clayey residuum. Permeability is moderate above the fragipan, very slow in the fragipan, and slow below the fragipan. Slopes range from 3 to 8 percent.

Soils of the Wilderness series are loamy-skeletal, siliceous, active, mesic Oxyaquic Fragiudalfs.

Typical pedon of Wilderness gravelly silt loam, 3 to 8 percent slopes; 1,400 feet north and 2,500 feet west of the southeast corner of sec. 16, T. 33 N., R. 13 W.; USGS Winnipeg topographic quadrangle; latitude

37 degrees 33 minutes 55 seconds N.; longitude 92 degrees 22 minutes 08 seconds W.

A—0 to 5 inches; brown (10YR 5/3) gravelly silt loam, pale brown (10YR 6/3) dry; weak very fine granular structure; friable; few fine and medium roots; 30 percent chert gravel; very strongly acid; abrupt smooth boundary.

E—5 to 9 inches; pale brown (10YR 6/3) very gravelly silt loam; weak very fine granular structure; friable; few fine, medium, and coarse roots; 40 percent chert gravel; very strongly acid; clear smooth boundary.

Bt1—9 to 13 inches; yellowish brown (10YR 5/6) very gravelly silt loam; weak very fine subangular blocky structure; friable; few fine and medium roots; few faint discontinuous clay films on faces of peds; 40 percent chert gravel; very strongly acid; clear smooth boundary.

Bt2—13 to 18 inches; strong brown (7.5YR 5/6) very gravelly silty clay loam; weak very fine and fine subangular blocky structure; firm; few fine and medium roots; common distinct continuous clay films on face of peds; 45 percent chert gravel; very strongly acid; clear wavy boundary.

Bt3—18 to 22 inches; yellowish brown (10YR 5/6) and pale light yellowish brown (10YR 6/4) very gravelly silt loam; weak very fine subangular blocky structure; firm; few fine and medium roots; few distinct discontinuous clay films on faces of peds; 55 percent chert gravel; very strongly acid; abrupt smooth boundary.

2Btx1—22 to 26 inches; strong brown (7.5YR 5/6) very gravelly silt loam; moderate coarse and very coarse prismatic structure parting to moderate fine subangular blocky; firm, brittle; few very fine and fine roots in mat at top of horizon and between vertical faces of prisms; common prominent pale brown (10YR 6/3) continuous silt coats; few distinct clay films on vertical faces of prisms; 60 percent chert gravel; strongly acid; clear smooth boundary.

2Btx2—26 to 33 inches; dark red (2.5YR 3/6) very gravelly sandy loam; moderate coarse and very coarse prismatic structure parting to weak very fine subangular blocky; firm, brittle; few very fine and fine roots between vertical faces of prisms; common prominent light brown (7.5YR 6/4) continuous silt coats; few distinct clay films on vertical faces of prisms; 55 percent chert gravel; strongly acid; clear irregular boundary.

3Bt1—33 to 50 inches; dark red (2.5YR 3/6) and strong brown (7.5YR 5/6) very gravelly clay; weak very fine and fine subangular blocky structure; firm; few

fine roots; many prominent continuous clay films on faces of peds and in pores; 50 percent chert gravel; strongly acid; clear smooth boundary.

3Bt2—50 to 80 inches; dark red (2.5YR 3/6) very gravelly clay; few medium prominent gray (10YR 5/1) iron depletions; weak very fine subangular blocky structure; firm; few fine roots; many prominent continuous clay films on faces of peds; 35 percent chert gravel; very strongly acid.

The depth to the fragipan ranges from 20 to 29 inches. Coarse fragment content ranges from 15 to 35 percent in the A horizon and 35 to 60 percent in the E and Bt horizons above the fragipan, 40 to 85 percent in the fragipan, and 25 to 80 percent below the fragipan.

The A horizon has value of 3, 4, or 5 and chroma of 2 or 3. The E horizon has value of 4 or 6. The Bt horizon has hue of 7.5YR or 10YR, value of 4, 5, or 6, and chroma of 4 or 6. The fragipan has hue of 2.5YR to 10YR, value of 3 to 8, and chroma of 2, 3, 4, or 6. Texture is the very gravelly or extremely gravelly analogues of silt loam, loam, silty clay loam, or sandy loam. The 3Bt horizon has hue of 10R to 7.5YR, value of 3, 4, or 5, and chroma of 4, 6, or 8. Texture is the gravelly, very gravelly, or extremely gravelly analogues of silty clay or clay.

Winnipeg Series

The Winnipeg series consists of very deep, well drained, moderately permeable soils on footslopes. These soils formed in silty loess and colluvium. Slopes range from 2 to 5 percent.

Soils of the Winnipeg series are fine-silty, mixed, active, mesic Typic Paleudalfs.

Typical pedon of Winnipeg silt loam, 2 to 5 percent slopes; 3,600 feet west and 4,300 feet south of the northeast corner of sec. 1, T. 34 N., R. 16 W.; USGS Lebanon topographic quadrangle; latitude 37 degrees 42 minutes 19 seconds N.; longitude 92 degrees 38 minutes 44 seconds W.

Ap—0 to 8 inches; brown (7.5YR 4/3) silt loam, light brown (7.5YR 6/4) dry; weak fine granular structure; friable; common fine roots; moderately acid; abrupt smooth boundary.

Bt1—8 to 12 inches; reddish brown (5YR 4/4) silt loam; weak fine subangular blocky structure; firm; few fine roots; few faint discontinuous clay films on faces of peds; moderately acid; abrupt smooth boundary.

Bt2—12 to 18 inches; reddish brown (5YR 4/4) silt loam; weak fine subangular blocky structure; firm; few fine roots; few distinct discontinuous clay films on faces of peds; moderately acid; clear smooth boundary.

Bt3—18 to 30 inches; yellowish red (5YR 4/6) silty clay loam; weak very fine subangular blocky structure; friable; few fine roots; common distinct continuous clay films on faces of peds; moderately acid; clear smooth boundary.

Bt4—30 to 40 inches; yellowish red (5YR 4/6) silty clay loam; weak very fine subangular blocky structure; friable; few fine roots; common distinct continuous clay films on faces of peds; 10 percent chert gravel; strongly acid; clear smooth boundary.

2Bt5—40 to 48 inches; red (2.5YR 4/6) very gravelly silty clay loam; weak fine subangular blocky structure; firm; few faint discontinuous clay films on faces of peds; few fine black (N 2/0) weakly cemented manganese concretions; 35 percent chert gravel; very strongly acid; clear smooth boundary.

2Bt6—48 to 80 inches; red (2.5YR 4/6) silty clay loam; weak fine subangular blocky structure; firm; few faint discontinuous clay films on faces of peds; common fine black (N 2/0) weakly cemented manganese concretions; very strongly acid.

Coarse fragment content ranges from 0 to 5 percent in the Ap horizon, 0 to 15 percent in the Bt horizon, and 0 to 35 percent in the 2Bt horizon.

The Ap horizon has hue of 7.5YR or 10YR, value of 3, 4, or 5, and chroma of 2, 3, or 4. The Bt horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3, 4, or 5, and chroma of 4, 6, or 8. The 2Bt horizon has hue of 2.5YR, 5YR, or 7.5YR and value of 3, 4, or 5. It is silty clay loam, gravelly silty clay loam, or very gravelly silty clay loam.

Formation of the Soils

This section relates the soils in the survey area to the major factors of soil formation. It also describes the geology and physiography of the county.

Factors of Soil Formation

Soils are continually changing. The characteristics of a soil at any given point are determined by the type of parent material; the plant and animal life on and in the soil; the climate under which the soil material accumulated and has existed since accumulation; the relief, or lay of the land; and the length of time that the forces of soil formation have acted on the soil material.

The parent material affects the kind of soil profile that is formed and, in extreme cases, determines it almost entirely. Plant and animal life, chiefly plants, are the active factors of soil formation. The climate determines the amount of water available for leaching and the amount of heat for physical and chemical changes. Together, climate and plant and animal life act on the parent material and slowly change it to a natural body that has genetically related horizons. Relief often modifies these other factors. Finally, time is required for changes in the parent material to result in the formation of a soil. Generally, a long time is required for the development of distinct soil horizons.

The factors of soil formation are all so closely interrelated in their effects on the soil that few generalizations can be made about the effect of any one factor unless conditions are specified for the other four. Soil formation is complex, and many processes of soil development are still unknown.

Parent Material

Parent material is the unconsolidated mass from which soil is formed. The formation or the deposition of this material is the first step in the development of a soil profile. The characteristics of the material determine the chemical and mineralogical composition of the soil. The soils in Laclede County formed in alluvium; residuum; cherty, silty or loamy sediments; loess; or in a combination of these materials.

Alluvium is soil material that was transported by water and deposited on the nearly level or very gently

sloping flood plains along streams. The major streams in Laclede County are the Gasconade and Niangua Rivers and the Osage Fork of the Gasconade River. The alluvial material was washed from the watersheds of these streams and their tributaries and deposited on the flood plains. It ranges from silt to sand and gravel. Racket soils formed in loamy sediments, Dapue soils formed in the silty material, and Cedargap soils formed in the silty material that has a high content of gravel.

Stream terraces are former flood plains that were abandoned because of downcutting of the streams to a lower elevation. The alluvial material on these terraces is clayey, silty, or loamy. Bearthicket, Britwater, and Hartville soils formed on these stream terraces.

The residuum in Laclede County is mainly material that weathered from cherty dolostone, dolostone, or sandstone. Clarksville, Gasconade, Gatewood, Ocie, and Poynor soils formed in residuum.

Cherty sediments are lag concentrations of chert and finer textured sediments associated with an erosional surface. On the steeper slopes, this material is the surface layer of the modern soil. In some areas where the land surface is stable, the cherty layers are overlain by loess or other silty or loamy sediments.

Loess is silty material deposited by the wind. Most of the uplands in the county have deposits of loess or have had them in the past. Erosion has removed the material from the steeper side slopes. Only the more stable ridgetops and a few areas of gently sloping to moderately sloping head slopes have a mantle ranging from 18 to 33 inches thick. Crelton, Plato, Tonti, and Viraton soils formed in a thin layer of loess and in the underlying cherty dolostone residuum.

Living Organisms

Plants and animals living on or in the soil are active in the soil-forming process. Plants, bacteria and fungi, burrowing animals, and human activities have varying impacts on soil formation. They have influenced the soil structure, content of organic matter and nitrogen, color, kinds and thickness of horizons, aeration, reaction, and other soil properties.

Plants greatly influence soil formation. Plant communities have varied at different times, depending

on the climate and the fertility, available water capacity, drainage class, and depth of soil. Most of the soils in the county formed predominantly under forest vegetation. Soils like Clarksville have a light colored surface layer and low organic matter content. Some soils in Laclede County, such as Crelton and Gasconade, formed under mixed prairie and forest vegetation and have a darker surface than those soils formed under a forest.

Worms, insects, burrowing animals, and large animals affect soil formation. Bacteria and fungi cause the decay of organic material, improve tilth, and fix nitrogen in the soil. The population of soil organisms is directly related to the rate at which organic material decomposes in the soil. The kinds of organisms in a given area and their activity are determined by the vegetation.

Intensive cultivation, clearing of trees, and other human activities also influence soil formation. In some areas, cultivation has mixed the surface layer with the subsurface layer, lowered the organic matter content, reduced the extent of biological activity in the soil, and decreased the stability of soil structure. In many areas, cultivation has increased the runoff rate and the susceptibility to erosion. Erosion has removed the original surface layer in some areas, thereby lowering the fertility and the productivity of the soil. The introduction of new crops and the application of chemicals, such as fertilizer and lime, may alter soil formation in the future.

Climate

Climate has significantly affected soil formation in Laclede County. Rainfall and temperature continue to affect soil formation. The rate of geologic erosion varies with the climate and influences the shape and character of the landforms that make up an area. Changes in the relative abundance and composition of plant and animal life are determined by climatic changes.

High temperatures and large amounts of rainfall accelerate chemical changes and physical disintegration in the soil. When calcium carbonate and other soluble salts are removed by leaching, soil fertility declines. This kind of climate also is conducive to the breakdown of clay minerals within the soil. The clay is moved downward from the surface horizon to subsoil horizons. This process is known as illuviation. Nearly all of the soils in the uplands, such as Plato and Poynor, show the effects of this process.

Local conditions can modify the influence of the general climate in a region. Variations in temperature

from high to low elevations have had only a slight influence on soil formation in the county. The effects of temperature variations on different aspects are more strongly expressed. For example, south- and west-facing slopes are warmer and drier than north- and east-facing slopes. The less desirable tree species grow on the warmer and drier slopes, and also grow slower.

Relief

Relief is characterized by gradient, or percent of slope, and by the length, shape, aspect, and uniformity of the slopes that make up a landscape. It affects soil formation mainly through its influence on drainage, runoff, and erosion.

Relief results from natural forces that create inequities in land surfaces. The steep, dissected topography of the eastern portion of Laclede County is a result of the deep entrenchment of the meandering Gasconade River and its tributaries into the Ozark peneplain. The divide between the valley of the Gasconade River and the valley of the Niangua River follows a course running southwest to northeast from Conway, through Lebanon, and through Richland. The northwestern portion of Laclede County is becoming entrenched by tributaries of the Niangua River.

The amount of water that percolates through the soil depends on the steepness of the slope, the permeability of the soil, and the amount and intensity of rainfall. Because runoff is rapid on the steeper soils, very little water percolates through the profile. As a result, these soils show little evidence of profile development. Runoff is slow on the gently sloping or nearly level soils, and most of the water percolates through the profile. As a result, these soils show the maximum profile development. (Rapidly permeable soils form more slowly than slowly permeable soils on similar slopes.)

Time

Time is an important factor of soil formation because it allows living organisms, climate, and relief to exert their influence on parent material. The degree to which soil-forming processes have changed the parent material determines the age of a soil. Thus, the age reflects the degree of profile development in a given soil rather than the number of years that the soil material has existed.

Dapue and Racket soils, which formed in alluvium deposited by floodwater receding from the Gasconade River, are some of the youngest soils in the county



Figure 18.—An area of Racket silt loam, 0 to 3 percent slopes, frequently flooded, borders the Gasconade River in Laclede County.

(fig. 18). The oldest soils formed in the nearly level or gently sloping areas at the highest elevations in the county. Plato and Viraton soils are examples. They have a well-expressed profile. They are dominantly acid throughout because the carbonates that were originally in the parent material have been leached to a great depth. Clay and silt accumulate in distinct subsoil horizons through translocation by water, and thus results in a fragipan. Some time is required for the formation of this fragipan.

Most of the soils in Laclede County are intermediate in age. Clarksville and Poynor soils formed in cherty dolostone or dolostone residuum on the steeper side

slopes in the uplands. They have an illuviated subsurface layer and have translocated clay in the subsoil.

Geology and Physiography

John W. Whitfield, geologist, Engineering Geology Section, Geology and Land Survey, Missouri Department of Natural Resources, helped prepare this section.

Laclede County is on the Salem Plateau, a subprovince of the Ozark Province. The landscape

varies from steeply sloping wooded hills and narrow, stony valleys to wide, flat, prairie-like uplands.

Bedrock has a gentle regional dip to the northwest. Several geologically old, inactive northwest-southeast trending faults cross Laclede County. Because of the effects of weathering, the bedrock surface is quite uneven. Glades or areas of relatively thin soil cover give way to areas of thick, stony soil and deeply weathered bedrock. Soil thickness can range from less than a foot to over 50 feet. Ridgetops and broad upland divides generally have the thickest soil cover, whereas steep side slopes may have little if any.

The sinkholes that frequently develop on the broad, prairie-like uplands vary from broad, bowl-shaped depressions encompassing several acres to steep-walled pits over 50 feet deep and 40 feet wide. In places, the lay of the upland prairies takes on a concave appearance due to numerous broad sink depressions.

Bedrock outcrops in Laclede County consist primarily of Ordovician cherty dolostone and sandstone from upper Jefferson City Formation down through the Roubidoux and Gasconade Formations to the Gunter Sandstone Formation along the Niangua River. Precambrian granite and diorite are about 1,700 to 1,800 feet below the surface. Small outcrops of Precambrian and Cambrian rocks occur in the Decaturville structure, which is bisected by the Laclede-Camden County line. The Decaturville structure is circular and is about 5 miles in diameter. It contains highly faulted and brecciated bedrock. In the uplifted center is a small outcrop of Precambrian pegmatite, some of it brecciated, composed of mica, quartz, tourmaline, and feldspar. The soils developed within the structure are more varied and occur in complex patterns or without patterns because of the amount of movement of the bedrock. Opinions vary concerning the origin of the structure, but detailed geologic studies support either meteorite impact or some kind of cryptoexplosive activity.

From oldest to youngest, the geologic formations that crop out in Laclede County are Gasconade Dolostone, Roubidoux Formation, and Jefferson City Dolostone. The thickness of the bedrock varies according to the extent of erosion and weathering.

Gasconade Dolostone is 300 to 350 feet thick. It consists of gray to light brown dolostone with thin to massive chert layers. The formation can be divided into two units. An upper unit, generally 40 to 60 feet

thick, comprises medium to massive beds of coarsely crystalline dolostone with small amounts of white porcellaneous chert. A distinct layer of cryptozoon chert that is 2 to 4 feet thick separates the upper unit from the lower unit. It is hard, ranges from white to blue-gray, and appears gnarled. The lower unit is very cherty. It consists of thin to medium beds of dolostone and thin chert beds and chert nodules. Outcrops of Gasconade Dolostone form high bluffs along major stream valleys in Laclede County. Most steep side slopes developed on Gasconade Dolostone have a very thin soil cover, which is cherty from the weathering of cherty bedrock.

The *Roubidoux Formation* is about 120 to 150 feet thick. The upper portion is often eroded; therefore, the thickness of the formation varies. The formation is composed of dolostone, chert, and several massive layers of sandstone. The formation crops out as bluffs of sandstone, chert, and dolostone along valleys and roadcuts. Outcrops often develop a ragged, dirty appearance because of the effects of weathering on interbedded layers of red quartzose sandstone, thin-bedded dolostone and red-stained chert. The land surface is covered by abundant chert and sandstone boulders. Weathering of the bedrock produces residual soil laden with various sized chert and sandstone fragments. Generally, surficial material is 5 to 10 feet thick, but where weathering has been severe, soil may be over 35 feet thick.

Jefferson City Dolostone consists of silty to crystalline dolostone with thin to medium beds of chert and thin sandstone and shale. The upper part of the formation is often severely weathered and eroded; consequently, the thickness of residuum and the depth to bedrock vary. The thickness of the bedrock is about 25 to 135 feet.

Groundwater supplies in Laclede County come mostly from the Cambrian Period Eminence and Potosi Formations, which yield several hundred gallons per minute.

Bedrock formations exposed in Laclede County produce little groundwater. The Jefferson City Dolostone produces 1 to 10 gallons per minute, and the Roubidoux Formation produces 5 to 10 gallons per minute. Water from these two formations is often contaminated by surface pollution and nearby poorly cased wells. The Gasconade Dolostone, a more reliable source of groundwater, yields 10 to 30 gallons per minute.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in

inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Backslopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Board foot. A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

Bottomland. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channeled. Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Clayey soil. Silty clay, sandy clay, or clay.

Clearcut. A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from the adjacent stands.

Climax plant community. The stabilized plant

community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Commercial forest. Forest land capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of

rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deep soil. A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per

cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Even aged. Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Footslope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is

an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Head out. To form a flower head.

Heavy metal. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:
O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or

browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore,

intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Karst (topography). The relief of an area underlain by

limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Merchantable trees. Trees that are of sufficient size to be economically processed into wood products.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately deep soil. A soil that is 20 to 40 inches

deep over bedrock or to other material that restricts the penetration of plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of

organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Overstory. The trees in a forest that form the upper crown cover.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percolates slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth).

Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees

of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sawlogs. Logs of suitable size and quality for the production of lumber.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shallow soil. A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder slope. The uppermost inclined surface at the top of a hillside. It is the transition zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skid trails. Pathways along which logs are dragged to a common site for loading onto a logging truck.

Slash. The branches, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of

blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Level	0 to 1 percent
Nearly level	0 to 2 percent
Very gently sloping	1 to 3 percent
Gently sloping	2 to 5 percent
Moderately sloping	3 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 20 percent
Steep	20 to 35 percent
Very steep	35 percent and higher

Classes for complex slopes are as follows:

Level	0 to 1 percent
Nearly level	0 to 2 percent
Gently undulating	1 to 3 percent
Undulating	2 to 5 percent
Gently rolling	3 to 8 percent
Rolling	8 to 15 percent
Hilly	15 to 20 percent
Steep	20 to 35 percent
Very steep	35 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Strath terrace. A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil

particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Tailwater. The water directly downstream of a structure.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Tread. The relatively flat surface that was cut or built by stream or wave action.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Very deep soil. A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Water-spreading. Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These

changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation
(Recorded in the period 1961-90 at Lebanon, Missouri)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Average snow- fall
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--		
°F	°F	°F	°F	°F	Units	In	In	In		In	
January-----	41.3	20.7	31.0	70	-10	49	1.69	0.53	2.63	3	4.0
February----	46.5	25.1	35.8	74	-5	83	2.05	0.90	3.03	4	4.0
March-----	57.8	34.7	46.3	82	7	260	3.76	2.05	5.26	6	2.8
April-----	69.3	45.1	57.2	88	23	519	3.87	2.13	5.40	6	.2
May-----	76.7	53.6	65.2	89	32	779	4.61	2.69	6.32	7	.0
June-----	84.2	62.0	73.1	95	43	992	4.10	2.32	5.67	6	.0
July-----	89.5	66.6	78.0	101	50	1,179	3.51	1.39	5.30	5	.0
August-----	88.3	65.1	76.7	101	49	1,138	3.39	1.90	4.70	4	.0
September---	80.2	57.8	69.0	95	35	871	4.03	2.06	5.74	6	.0
October-----	70.2	46.5	58.4	89	25	570	4.04	2.02	5.79	5	.0
November----	56.5	36.0	46.2	78	11	241	3.66	1.62	5.41	5	1.0
December	44.9	25.6	35.3	71	-5	79	2.67	1.26	3.88	5	2.2
Yearly:											
Average----	67.1	44.9	56.0	---	---	---	---	---	---	---	---
Extreme----	108	-19	---	103	-13	---	---	---	---	---	---
Total-----	---	---	---	---	---	6,760	41.38	34.62	47.70	62	14.2

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall
(Recorded in the period 1961-90 at Lebanon, Missouri)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 6	April 18	May 5
2 years in 10 later than--	April 2	April 13	April 30
5 years in 10 later than--	March 25	April 4	April 21
First freezing temperature in fall:			
1 year in 10 earlier than--	October 26	October 12	September 29
2 years in 10 earlier than--	October 31	October 18	October 4
5 years in 10 earlier than--	November 9	October 30	October 15

Table 3.--Growing Season
(Recorded in the period 1961-90 at Lebanon,
Missouri)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	<u>Days</u>	<u>Days</u>	<u>Days</u>
9 years in 10	200	183	158
8 years in 10	206	190	164
5 years in 10	217	203	176
2 years in 10	228	217	189
1 year in 10	233	224	195

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
66000	Moniteau silt loam, 0 to 2 percent slopes, occasionally flooded-----	2,538	0.5
70006	Crelton silt loam, 1 to 3 percent slopes-----	1,783	0.4
70020	Blueeye gravelly silt loam, 3 to 8 percent slopes-----	3,078	0.6
70021	Moko very gravelly loam, 50 to 80 percent slopes-----	2,004	0.4
70022	Tonti silt loam, 3 to 8 percent slopes-----	6,443	1.3
71250	Britwater silt loam, 1 to 3 percent slopes, rarely flooded-----	3,726	0.8
71251	Britwater silt loam, 3 to 8 percent slopes, very rarely flooded-----	4,895	1.0
73000	Pomme silt loam, 3 to 8 percent slopes-----	2,765	0.6
73007	Plato silt loam, 1 to 3 percent slopes-----	6,972	1.4
73010	Wilderness gravelly silt loam, 3 to 8 percent slopes-----	101,555	20.6
73013	Lowassie silt loam, 0 to 3 percent slopes, frequently ponded-----	1,051	0.2
73014	Clarksville very gravelly silt loam, 8 to 15 percent slopes-----	34,783	7.1
73015	Viraton silt loam, 1 to 3 percent slopes-----	55,090	11.2
73016	Viraton silt loam, 3 to 8 percent slopes-----	9,555	1.9
73017	Bendavis-Poynor complex, rocky, 15 to 50 percent slopes, very stony-----	4,219	0.9
73018	Clarksville very gravelly silt loam, 15 to 35 percent slopes-----	53,772	10.9
73019	Poynor very gravelly silt loam, 1 to 8 percent slopes-----	7,776	1.6
73020	Poynor very gravelly silt loam, 8 to 15 percent slopes-----	18,171	3.7
73021	Poynor extremely gravelly silt loam, 15 to 35 percent slopes, stony-----	13,444	2.7
73022	Alred-Bardley complex, 8 to 15 percent slopes-----	1,368	0.3
73023	Mano-Ocie complex, 1 to 8 percent slopes-----	1,070	0.2
73024	Mano-Ocie complex, 8 to 15 percent slopes, stony-----	4,835	1.0
73025	Gatewood-Ocie complex, 3 to 8 percent slopes-----	23,862	4.9
73026	Gatewood-Ocie complex, 8 to 15 percent slopes-----	25,578	5.2
73027	Gatewood-Ocie complex, 15 to 35 percent slopes-----	19,081	3.9
73028	Rueter-Bardley complex, 15 to 60 percent slopes-----	19,351	3.9
73029	Gasconade-Gatewood-Rock outcrop complex, 3 to 15 percent slopes-----	4,274	0.9
73030	Gasconade very gravelly clay loam, very rocky, 35 to 50 percent slopes, extremely stony-----	1,454	0.3
73032	Gatewood very gravelly silt loam, 3 to 15 percent slopes, stony-----	247	*
73033	Gatewood extremely gravelly silt loam, very rocky, 15 to 35 percent slopes, very stony-----	200	*
73051	Winnipeg silt loam, 2 to 5 percent slopes-----	644	0.1
74626	Tanglenook silt loam, 0 to 3 percent slopes, rarely flooded-----	1,328	0.3
74627	Hartville silt loam, 1 to 3 percent slopes, rarely flooded-----	2,826	0.6
75377	Racket silt loam, 0 to 3 percent slopes, frequently flooded-----	9,281	1.9
75379	Kaintuck loam, 0 to 3 percent slopes, frequently flooded-----	1,236	0.3
75380	Dapue silt loam, 0 to 3 percent slopes, occasionally flooded-----	9,285	1.9
75381	Bearthicket silt loam, 0 to 3 percent slopes, rarely flooded-----	4,710	1.0
75382	Cedargap gravelly loam, 0 to 3 percent slopes, frequently flooded-----	21,631	4.4
75383	Cedargap silt loam, 0 to 3 percent slopes, frequently flooded-----	4,335	0.9
99000	Pits, quarries-----	135	*
99001	Water-----	967	0.2
99002	Orthents, borrow area, clayey-----	311	*
	Total-----	491,629	100.0

* Less than 0.1 percent.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability	Caucasian bluestem	Corn	Orchardgrass- alfalfa hay	Sorghum silage	Tall fescue hay	Winter wheat
		AUM*	Bu	Tons	Tons	AUM*	Bu
66000: Moniteau-----	3w	---	90.00	---	9.00	8.60	32.00
70006: Crelton-----	2e	13.00	80.00	4.00	10.00	8.00	37.00
70020: Blueye-----	4e	8.50	---	2.50	4.00	5.20	27.00
70021: Moko-----	7s	---	---	---	---	---	---
70022: Tonti-----	3e	8.50	60.00	3.10	9.00	5.20	30.00
71250: Britwater-----	2e	13.00	85.00	4.00	10.00	9.20	40.00
71251: Britwater-----	3e	11.00	70.00	3.60	8.00	8.70	35.00
73000: Pomme-----	3e	11.00	70.00	3.60	8.00	8.70	35.00
73007: Plato-----	2e	9.50	80.00	3.50	9.00	7.00	33.00
73010: Wilderness-----	4e	7.50	---	2.10	---	5.00	25.00
73013: Lowassie-----	3w	---	50.00	---	5.00	5.20	25.00
73014: Clarksville-----	6e	5.20	---	---	---	4.00	---
73015: Viraton-----	2e	10.50	60.00	3.00	6.00	7.00	31.00
73016: Viraton-----	3e	9.20	55.00	2.50	5.00	6.40	26.00
73017: Bendavis-----	7e	2.00	---	---	---	1.00	---
Poynor-----	7e	5.00	---	---	---	3.00	---
73018: Clarksville-----	7e	3.00	---	---	---	2.30	---
73019: Poynor-----	4e	10.50	55.00	3.00	5.00	7.00	29.00
73020: Poynor-----	6e	9.00	---	---	---	6.40	---
73021: Poynor-----	7e	7.20	---	---	---	3.00	---

See footnote at end of table.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Caucasian bluestem	Corn	Orchardgrass- alfalfa hay	Sorghum silage	Tall fescue hay	Winter wheat
		AUM*	Bu	Tons	Tons	AUM*	Bu
73022:							
Alred-----	6e	8.50	---	---	---	6.90	---
Bardley-----	6e	6.00	---	---	---	3.00	---
73023:							
Mano-----	4e	10.00	52.00	3.20	5.20	7.20	31.00
Ocie-----	4e	9.00	47.00	3.00	5.00	7.00	27.00
73024:							
Mano-----	6e	8.20	---	---	---	6.60	---
Ocie-----	6e	7.00	---	---	---	6.40	---
73025:							
Gatewood-----	4e	6.50	35.00	2.00	3.50	4.70	22.00
Ocie-----	4e	7.50	45.00	3.00	4.50	5.70	32.00
73026:							
Gatewood-----	6e	5.10	---	---	---	4.30	---
Ocie-----	6e	6.10	---	---	---	5.30	---
73027:							
Gatewood-----	7e	3.00	---	---	---	2.00	---
Ocie-----	7e	4.00	---	---	---	3.00	---
73028:							
Rueter-----	7e	3.00	---	---	---	2.30	---
Bardley-----	7e	2.00	---	---	---	2.00	---
73029:							
Gasconade-----	7s	---	---	---	---	---	---
Gatewood-----	6e	---	---	---	---	---	---
Rock outcrop-----	8s	---	---	---	---	---	---
73030:							
Gasconade-----	7s	---	---	---	---	---	---
73032:							
Gatewood-----	6e	5.00	---	---	---	4.00	---
73033:							
Gatewood-----	7e	3.00	---	---	---	2.00	---
73051:							
Winnipeg-----	2e	15.50	105.00	5.50	12.00	10.00	45.00
74626:							
Tanglenook-----	3w	---	70.00	---	9.00	7.00	33.00
74627:							
Hartville-----	2e	8.40	85.00	---	10.00	7.90	30.00
75377:							
Racket-----	2w	14.00	90.00	3.50	10.00	9.20	38.00

See footnote at end of table.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Caucasian bluestem	Corn	Orchardgrass- alfalfa hay	Sorghum silage	Tall fescue hay	Winter wheat
		<u>AUM*</u>	<u>Bu</u>	<u>Tons</u>	<u>Tons</u>	<u>AUM*</u>	<u>Bu</u>
75379: Kaintuck-----	3w	12.00	65.00	3.30	9.00	7.50	29.00
75380: Dapue-----	2w	16.00	110.00	5.80	14.00	10.50	45.00
75381: Bearthicket-----	1	15.00	110.00	5.80	12.00	10.00	45.00
75382: Cedargap-----	3w	10.00	50.00	3.50	7.50	7.90	32.00
75383: Cedargap-----	3w	15.50	60.00	5.50	12.00	10.00	37.00
99000. Pits, quarries							
99001. Water							
99002. Orthents, borrow area, clayey							

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

Table 6.-Pasture and Hayland Suitability Groups

Map symbol	Soil name	Component name	Pasture and hayland suitability groups
66000	Moniteau silt loam, 0 to 2 percent slopes, occasionally flooded-----	Moniteau	WLB
70006	Creldon silt loam, 1 to 3 percent slopes-----	Creldon	LYP
70020	Blueye gravelly silt loam, 3 to 8 percent slopes-----	Blueye	MDU
70021	Moko very gravelly loam, 50 to 80 percent slopes-----	Moko	GNS
70022	Tonti silt loam, 3 to 8 percent slopes-----	Tonti	LYP
71250	Britwater silt loam, 1 to 3 percent slopes, rarely flooded-----	Britwater	LYU
71251	Britwater silt loam, 3 to 8 percent slopes, very rarely flooded-----	Britwater	LYU
73000	Pomme silt loam, 3 to 8 percent slopes-----	Pomme	LYU
73007	Plato silt loam, 1 to 3 percent slopes-----	Plato	WTP
73010	Wilderness gravelly silt loam, 3 to 8 percent slopes-----	Wilderness	GRP
73013	Lowassie silt loam, 0 to 3 percent slopes, frequently ponded-----	Lowassie	WCU
73014	Clarksville very gravelly silt loam, 8 to 15 percent slopes-----	Clarksville	GRU
73015	Viraton silt loam, 1 to 3 percent slopes-----	Viraton	LYP
73016	Viraton silt loam, 3 to 8 percent slopes-----	Viraton	LYP
73017	Bendavis-Poynor complex, rocky, 15 to 50 percent slopes, very stony----	Bendavis	GNS
		Poynor	GNS
73018	Clarksville very gravelly silt loam, 15 to 35 percent slopes-----	Clarksville	GNS
73019	Poynor very gravelly silt loam, 1 to 8 percent slopes-----	Poynor	GRU
73020	Poynor very gravelly silt loam, 8 to 15 percent slopes-----	Poynor	GRU
73021	Poynor extremely gravelly silt loam, 15 to 35 percent slopes, stony----	Poynor	GNS
73022	Alred-Bardley complex, 8 to 15 percent slopes-----	Alred	GRU
		Bardley	MDU
73023	Mano-Ocie complex, 1 to 8 percent slopes-----	Mano	GRU
		Ocie	GRU
73024	Mano-Ocie complex, 8 to 15 percent slopes, stony-----	Mano	GRU
		Ocie	GRU
73025	Gatewood-Ocie complex, 3 to 8 percent slopes-----	Gatewood	MDU
		Ocie	GRU
73026	Gatewood-Ocie complex, 8 to 15 percent slopes-----	Gatewood	MDU
		Ocie	GRU
73027	Gatewood-Ocie complex, 15 to 35 percent slopes-----	Gatewood	GNS
		Ocie	GNS
73028	Rueter-Bardley complex, 15 to 60 percent slopes-----	Rueter	GNS
		Bardley	GNS
73029	Gasconade-Gatewood-Rock outcrop complex, 3 to 15 percent slopes-----	Gasconade	SHU
		Gatewood	MDU
		Rock outcrop	---
73030	Gasconade very gravelly clay loam, very rocky, 35 to 50 percent slopes, extremely stony-----	Gasconade	GNS
73032	Gatewood very gravelly silt loam, 3 to 15 percent slopes, stony-----	Gatewood	MDU
73033	Gatewood extremely gravelly silt loam, very rocky, 15 to 35 percent slopes, very stony-----	Gatewood	GNS
73051	Winnipeg silt loam, 2 to 5 percent slopes-----	Winnipeg	LYU
74626	Tanglenook silt loam, 0 to 3 percent slopes, rarely flooded-----	Tanglenook	WCB
74627	Hartville silt loam, 1 to 3 percent slopes, rarely flooded-----	Hartville	WCB
75377	Racket silt loam, 0 to 3 percent slopes, frequently flooded-----	Racket	WLO
75379	Kaintuck loam, 0 to 3 percent slopes, frequently flooded-----	Kaintuck	LYO
75380	Dapue silt loam, 0 to 3 percent slopes, occasionally flooded-----	Dapue	LYO
75381	Bearthicket silt loam, 0 to 3 percent slopes, rarely flooded-----	Bearthicket	LYO
75382	Cedargap gravelly loam, 0 to 3 percent slopes, frequently flooded-----	Cedargap	GR0
75383	Cedargap silt loam, 0 to 3 percent slopes, frequently flooded-----	Cedargap	GR0
99000	Pits, quarries-----	Pits, quarries	---
99001	Water-----	Water	---
99002	Orthents, borrow area, clayey-----	Orthents, clayey	---

Table 7.--Woodland Management and Productivity
(Only the soils suitable for production of commercial trees are listed)

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index	Volume* of wood fiber m3/ha	
66000: Moniteau-----	4W	Slight	Severe	Moderate	Moderate	Severe	Pin oak-----	70	4	Black willow, eastern cottonwood, green ash, pin oak, silver maple, sweetgum
70020: Blueeye-----	2A	Slight	Slight	Slight	Slight	Moderate	Blackjack oak-----	---	---	Eastern redcedar
							Eastern redcedar----	35	2	
							Post oak-----	---	---	
70021: Moko-----	2X	Slight	Moderate	Moderate	Severe	Slight	Eastern redcedar----	30	2	Eastern redcedar
70022: Tonti-----	3D	Slight	Slight	Slight	Moderate	Slight	Black oak-----	60	3	Black oak, shortleaf pine
							Post oak-----	---	---	
							Shortleaf pine-----	53	3	
71250, 71251: Britwater-----	8A	Slight	Slight	Slight	Slight	Moderate	Eastern redcedar----	50	4	Northern red oak, shortleaf pine, white oak
							Northern red oak----	70	4	
							Shortleaf pine-----	70	8	
73000: Pomme-----	3A	Slight	Slight	Slight	Slight	Moderate	Northern red oak----	65	3	Black walnut, white oak, northern red oak
							White oak-----	65	3	
73007: Plato-----	3D	Slight	Slight	Slight	Moderate	Slight	Black oak-----	60	3	Black oak, shortleaf pine
							Shortleaf pine-----	---	---	
							White oak-----	55	3	
73010: Wilderness-----	3D	Slight	Slight	Moderate	Moderate	Slight	Black oak-----	63	3	Black oak, shortleaf pine
							Northern red oak----	64	3	
							White oak-----	56	3	
73013: Lowassie-----	2W	Slight	Severe	Severe	Severe	Severe	Black oak-----	50	2	Black oak, pin oak
							Blackjack oak-----	---	---	
							Post oak-----	45	2	
73014: Clarksville-----	3F	Slight	Slight	Moderate	Slight	Moderate	Black oak-----	61	3	Shortleaf pine, white oak, black oak
							Northern red oak----	61	3	
							Shortleaf pine-----	61	6	
							White oak-----	58	3	
73015, 73016: Viraton-----	3D	Slight	Slight	Moderate	Moderate	Slight	Black oak-----	60	3	Black oak, shortleaf pine
							Shortleaf pine-----	56	6	
							White oak-----	55	3	

See footnote at end of table.

Table 7.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordi- nation symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Plant competi- tion	Common trees	Site index	Volume* of wood fiber m3/ha	
73017: Bendavis-----	2R	Moderate	Moderate	Moderate	Slight	Moderate	Black oak----- Post oak----- Shortleaf pine-----	48 45 ---	2 2 ---	Shortleaf pine
Poynor-----	3R	Moderate	Moderate	Moderate	Slight	Moderate	Black oak----- Shortleaf pine----- White oak-----	53 55 48	3 3 2	Black oak, shortleaf pine
73018: Clarksville----	3R	Moderate	Moderate	Moderate	Slight	Moderate	Black oak----- Northern red oak---- Shortleaf pine----- White oak-----	61 61 61 58	3 3 6 3	Shortleaf pine, white oak, black oak
73019, 73020: Poynor-----	3A	Slight	Slight	Moderate	Slight	Moderate	Black oak----- Shortleaf pine----- White oak-----	53 55 48	3 3 2	Black oak, shortleaf pine
73021: Poynor-----	3R	Moderate	Moderate	Moderate	Slight	Moderate	Black oak----- Shortleaf pine----- White oak-----	53 55 48	3 3 2	Black oak, shortleaf pine
73022: Alred-----	3F	Slight	Moderate	Severe	Slight	Moderate	Northern red oak---- Shortleaf pine----- White oak-----	65 70 65	3 8 3	Northern red oak, white oak
Bardley-----	2D	Slight	Slight	Slight	Moderate	Slight	Black oak----- Post oak----- White oak-----	54 48 42	3 2 2	Black oak, eastern redcedar, shortleaf pine
73023, 73024: Mano-----	3F	Slight	Slight	Moderate	Slight	Moderate	Black oak----- Northern red oak---- White oak-----	63 --- 58	3 --- 3	Northern red oak, shortleaf pine
Ocie-----	3F	Slight	Slight	Moderate	Slight	Slight	Black oak----- Northern red oak---- White oak-----	58 --- 57	3 --- 3	Northern red oak, shortleaf pine
73025: Gatewood-----	2A	Slight	Slight	Slight	Slight	Moderate	Black oak----- Eastern redcedar---- Post oak----- White oak-----	42 40 43 45	2 3 2 2	Eastern redcedar, shortleaf pine
Ocie-----	3F	Slight	Slight	Moderate	Slight	Slight	Black oak----- Northern red oak---- White oak-----	58 --- 57	3 --- 3	Northern red oak, shortleaf pine
73026: Gatewood-----	3F	Slight	Slight	Moderate	Slight	Slight	Black oak----- Northern red oak---- White oak-----	58 --- 57	3 --- 3	Northern red oak, shortleaf pine

See footnote at end of table.

Table 7.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index	Volume* of wood fiber m3/ha	
73026: Ocie-----	2A	Slight	Slight	Slight	Slight	Moderate	Black oak----- Eastern redcedar---- Post oak----- White oak-----	42 40 43 45	2 3 2 2	Eastern redcedar, shortleaf pine
73028: Rueter-----	3R	Severe	Severe	Moderate	Slight	Moderate	Black oak----- Northern red oak---- White oak-----	61 61 58	3 3 3	Shortleaf pine, white oak, northern red oak
Bardley. 73029: Gasconade-----	2D	Slight	Moderate	Moderate	Severe	Slight	Blackjack oak----- Chinkapin oak----- Eastern redcedar---- Post oak-----	--- 40 27 ---	--- 2 2 ---	Eastern redcedar
Gatewood-----	2A	Slight	Slight	Slight	Slight	Moderate	Black oak----- Eastern redcedar---- Post oak----- White oak-----	42 40 43 45	2 3 2 2	Eastern redcedar, shortleaf pine
Rock outcrop. 73030: Gasconade-----	2R	Moderate	Severe	Severe	Severe	Slight	Blackjack oak----- Chinkapin oak----- Eastern redcedar---- Post oak-----	--- 41 27 ---	--- 2 2 ---	Eastern redcedar
73032, 73033: Gatewood-----	2A	Slight	Slight	Slight	Slight	Moderate	Black oak----- Eastern redcedar---- Post oak----- White oak-----	42 40 43 45	2 3 2 2	Eastern redcedar, shortleaf pine
73051: Winnipeg-----	3A	Slight	Slight	Slight	Slight	Slight	American sycamore--- Black oak----- Black walnut----- Shortleaf pine----- White oak-----	--- --- --- --- 60	--- --- --- --- 3	American sycamore, black walnut
74626: Tanglenook-----	2W	Slight	Severe	Moderate	Moderate	Severe	Eastern cottonwood-- Silver maple-----	90 80	7 2	American sycamore, eastern cottonwood, pin oak, silver maple
74627: Hartville-----	3C	Slight	Slight	Severe	Severe	Slight	White oak-----	55	3	Eastern cottonwood, pin oak
75377: Racket-----	5A	Slight	Slight	Slight	Slight	Moderate	Black cherry----- Black walnut----- Northern red oak---- White ash-----	--- 72 --- ---	--- 5 --- ---	Black walnut, northern red oak

See footnote at end of table.

Table 7.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index	Volume* of wood fiber m3/ha	
75379: Kaintuck-----	7W	Slight	Moderate	Slight	Slight	Moderate	American sycamore--- Black walnut----- Northern red oak---- River birch----- White oak-----	90 --- --- --- ---	7 --- --- --- ---	American sycamore, black walnut, green ash, northern red oak
75380: Dapue-----	7A	Slight	Slight	Slight	Slight	---	Northern red oak----	85	4	Black walnut, northern red oak
75381: Bearthicket-----	7A	Slight	Slight	Slight	Slight	Severe	American sycamore--- Black walnut----- Cherrybark oak----- Common hackberry---- Pin oak----- Red maple-----	--- --- 95 --- 96 ---	--- --- 9 --- 6 ---	Black walnut, cherrybark oak, eastern white pine, loblolly pine, northern red oak, shortleaf pine, tuliptree, white ash, white oak
75382, 75383: Cedargap-----	3F	Slight	Slight	Moderate	Slight	Moderate	Black oak----- Black walnut----- Green ash-----	66 --- ---	3 --- ---	Black oak, shortleaf pine

* Volume is the yield in cubic meters per hectare per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

Table 8.--Windbreaks and Environmental Plantings

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil.)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-				
	<8	8-15	16-25	26-35	>35
66000: Moniteau-----	Buttonbush	Possumhaw	Nannyberry, eastern arborvitae, eastern redcedar	Common hackberry, baldcypress, pin oak, green ash	Eastern cottonwood
70006. Credon					
70020: Blueye-----	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, honeylocust	---	---
70021. Moko					
70022: Tonti-----	Common lilac, ninebark	Amur maple, gray dogwood	Manchurian crabapple, eastern redcedar, common hackberry, green ash, Virginia pine	Honeylocust	---
71250, 71251: Britwater-----	Common lilac, fragrant sumac	---	Russian olive, bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, honeylocust	---	---
73000. Pomme					
73007: Plato-----	Common lilac, ninebark	Amur maple, gray dogwood	Manchurian crabapple, eastern redcedar, common hackberry, green ash, Austrian pine	Honeylocust	---
73010: Wilderness-----	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, honeylocust	---	---
73013. Lowassie					
73014. Clarksville					

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-				
	<8	8-15	16-25	26-35	>35
73015, 73016: Viraton-----	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, honeylocust	---	---
73017: Bendavis-----	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, honeylocust	---	---
Poynor.					
73018. Clarksville					---
73019, 73020, 73021. Poynor					
73022: Alred.					
Bardley-----	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, honeylocust	---	---
73023, 73024: Mano-----	Common lilac, ninebark	Amur maple, gray dogwood	Manchurian crabapple, eastern redcedar, common hackberry, green ash, Virginia pine	Honeylocust	---
Ocie-----	Fragrant sumac	American plum, gray dogwood, southern arrowwood	Washington hawthorn, eastern redbud, eastern redcedar	White fir, green ash, northern red oak, tuliptree	Eastern white pine
73025, 73026, 73027: Gatewood-----	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, honeylocust	---	---
Ocie-----	Fragrant sumac	American plum, gray dogwood, southern arrowwood	Washington hawthorn, eastern redbud, eastern redcedar	White fir, green ash, northern red oak, tuliptree	Eastern white pine
73028: Rueter.					
Bardley.					
73029: Gasconade.					

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-				
	<8	8-15	16-25	26-35	>35
73029: Gatewood-----	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, honeylocust	---	---
Rock outcrop.					
73030. Gasconade					
73032, 73033: Gatewood-----	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, honeylocust	---	---
73051: Winnipeg-----	American plum, fragrant sumac	Common lilac, Amur maple, blackhaw	Eastern redcedar	Common hackberry, green ash, honeylocust, pin oak, eastern white pine	Eastern cottonwood
74626: Tanglenook-----	Buttonbush, redosier dogwood	Silky dogwood	Nannyberry, eastern arborvitae, Austrian pine	Green ash, baldcypress, pin oak	Eastern cottonwood
74627: Hartville-----	Common lilac, ninebark	Amur maple, gray dogwood	Manchurian crabapple, eastern redcedar, common hackberry, green ash, Virginia pine,	Honeylocust	---
75377. Racket					
75379: Kaintuck-----	American plum, fragrant sumac	Common lilac, Amur maple, blackhaw	Eastern redcedar	Common hackberry, green ash, honeylocust, pin oak, eastern white pine	Eastern cottonwood
75380: Dapue-----	Silky dogwood	American cranberrybush	Amur privet, Washington hawthorn, eastern arborvitae, white fir	Austrian pine, Norway spruce	Pin oak, eastern white pine
75381: Bearthicket-----	American plum, fragrant sumac	Common lilac, Amur maple, blackhaw	Eastern redcedar	Common hackberry, green ash, honeylocust, pin oak, eastern white pine	Eastern cottonwood
75382, 75383. Cedargap					

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-				
	<8	8-15	16-25	26-35	>35
99000. Pits, quarries					
99001. Water					
99002. Orthents, borrow area, clayey					

Table 9.--Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
66000: Moniteau-----	Severe: flooding wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
70006: Crelton-----	Severe: percs slowly	Severe: percs slowly	Severe: percs slowly	Moderate: wetness	Moderate: wetness
70020: Blueye-----	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly small stones	Slight	Moderate: small stones droughty
70021: Moko-----	Severe: slope small stones depth to rock	Severe: slope small stones depth to rock	Severe: slope small stones depth to rock	Severe: slope	Severe: large stones slope small stones depth to rock
70022: Tonti-----	Severe: percs slowly	Severe: percs slowly	Severe: percs slowly	Moderate: wetness	Moderate: wetness droughty
71250: Britwater-----	Severe: flooding	Slight	Slight	Slight	Slight
71251: Britwater-----	Severe: flooding	Slight	Moderate: slope	Slight	Slight
73000: Pomme-----	Slight	Slight	Moderate: slope	Slight	Slight
73007: Plato-----	Severe: percs slowly wetness	Severe: percs slowly	Severe: percs slowly wetness	Moderate: erodes easily	Moderate: wetness droughty
73010: Wilderness-----	Severe: percs slowly	Severe: percs slowly	Severe: small stones	Moderate: wetness	Severe: droughty
73013: Lowassie-----	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding
73014: Clarksville-----	Severe: small stones	Severe: small stones	Severe: slope small stones	Slight	Severe: small stones

Table 9.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
73015, 73016: Viraton-----	Severe: percs slowly	Severe: percs slowly	Severe: percs slowly	Moderate: wetness	Moderate: wetness droughty
73017: Bendavis-----	Severe: slope small stones	Severe: slope small stones	Severe: large stones slope	Severe: large stones slope	Severe: slope small stones droughty
Poynor-----	Severe: slope small stones	Severe: slope small stones	Severe: large stones slope	Severe: large stones slope	Severe: slope small stones droughty
73018: Clarksville-----	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope	Severe: slope small stones
73019, 73020: Poynor-----	Severe: small stones	Severe: small stones	Severe: small stones	Slight	Severe: small stones droughty
73021: Poynor-----	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones droughty
73022: Alred-----	Severe: small stones	Severe: small stones	Severe: slope small stones	Slight	Severe: small stones droughty
Bardley-----	Severe: small stones	Severe: small stones	Severe: slope small stones	Slight	Severe: small stones droughty
73023: Mano-----	Moderate: percs slowly small stones	Moderate: percs slowly small stones	Severe: small stones	Slight	Severe: small stones droughty
Ocie-----	Moderate: percs slowly small stones	Moderate: percs slowly small stones	Severe: small stones	Slight	Severe: small stones droughty
73024: Mano-----	Moderate: percs slowly small stones slope	Moderate: percs slowly small stones slope	Severe: slope small stones	Slight	Severe: small stones droughty
Ocie-----	Moderate: percs slowly small stones slope	Moderate: percs slowly small stones slope	Severe: slope small stones	Slight	Severe: small stones droughty

Table 9.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
73025: Gatewood-----	Moderate: percs slowly small stones	Moderate: percs slowly small stones	Severe: small stones	Slight	Severe: small stones droughty
Ocie-----	Moderate: percs slowly small stones	Moderate: percs slowly small stones	Severe: small stones	Slight	Severe: small stones droughty
73026: Gatewood-----	Moderate: percs slowly small stones slope	Moderate: percs slowly small stones slope	Severe: slope small stones	Slight	Severe: small stones droughty
Ocie-----	Moderate: percs slowly small stones slope	Moderate: percs slowly small stones slope	Severe: slope small stones	Slight	Moderate: small stones droughty
73027: Gatewood-----	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope	Severe: slope small stones droughty
Ocie-----	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope	Severe: slope small stones droughty
73028: Rueter-----	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones droughty
Bardley-----	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones droughty
73029: Gasconade-----	Severe: small stones depth to rock	Severe: small stones depth to rock	Severe: slope small stones depth to rock	Slight	Severe: small stones depth to rock
Gatewood-----	Severe: small stones	Severe: small stones	Severe: slope small stones	Slight	Moderate: small stones droughty
Rock outcrop.					
73030: Gasconade-----	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope	Severe: large stones slope depth to rock droughty

Table 9.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
73032: Gatewood-----	Severe: large stones	Severe: small stones	Severe: large stones slope	Slight	Moderate: large stones small stones droughty
73033: Gatewood-----	Severe: large stones slope	Severe: slope small stones	Severe: large stones slope	Severe: slope small stones	Moderate: large stones slope small stones droughty
73051: Winnipeg-----	Slight	Slight	Moderate: slope	Slight	Slight
74626: Tanglenook-----	Severe: flooding wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
74627: Hartville-----	Severe: flooding wetness	Moderate: percs slowly wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
75377: Racket-----	Severe: flooding	Moderate: flooding	Severe: flooding	Moderate: flooding	Severe: flooding
75379: Kaintuck-----	Severe: flooding	Moderate: flooding	Severe: flooding	Moderate: flooding	Severe: flooding
75380: Dapue-----	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
75381: Bearthicket-----	Severe: flooding	Slight	Slight	Slight	Slight
75382: Cedargap-----	Severe: flooding	Moderate: flooding	Severe: flooding small stones	Moderate: flooding	Severe: flooding small stones
75383: Cedargap-----	Severe: flooding	Moderate: flooding	Severe: flooding	Moderate: flooding	Severe: flooding small stones
99000. Pits, quarries					
99001. Water					
99002. Orthents, borrow area, clayey					

Table 10.--Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life
66000: Moniteau-----	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair
70006: Credon-----	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
70020: Blueye-----	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
70021: Moko-----	Very poor	Very poor	Poor	Poor	Fair	Very poor	Very poor	Poor	Poor	Very poor
70022: Tonti-----	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Very poor
71250: Britwater-----	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
71251: Britwater-----	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
73000: Pomme-----	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
73007: Plato-----	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor
73010: Wilderness-----	Poor	Fair	Poor	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor
73013: Lowassie-----	Fair	Fair	Good	Fair	Fair	Good	Good	Fair	Fair	Fair
73014: Clarksville-----	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
73015, 73016: Viraton-----	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor
73017: Bendavis-----	Very poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Poynor-----	Very poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor

Table 10.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life
73018: Clarksville-----	Very poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
73019, 73020: Poynor-----	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
73021: Poynor-----	Very poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
73022: Alred-----	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
Bardley-----	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
73023: Mano-----	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor
Ocie-----	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor
73024: Mano-----	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Ocie-----	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
73025: Gatewood-----	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
Ocie-----	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
73026: Gatewood-----	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
Ocie-----	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
73027: Gatewood-----	Very poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Ocie-----	Very poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
73028: Rueter-----	Very poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Bardley-----	Very poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor

Table 10.--Wildlife Habitat--Continued

[illegible]

Table 11.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
66000: Moniteau-----	Severe: wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding low strength wetness frost action	Severe: wetness
70006: Creldon-----	Severe: wetness	Moderate: shrink-swell wetness	Severe: wetness	Moderate: shrink-swell wetness	Severe: low strength	Moderate: wetness droughty
70020: Blueye-----	Severe: depth to rock	Severe: shrink-swell	Severe: shrink-swell depth to rock	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: small stones droughty depth to rock
70021: Moko-----	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope small stones depth to rock droughty
70022: Tonti-----	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: slope wetness	Moderate: wetness frost action	Moderate: wetness droughty
71250, 71251: Britwater-----	Moderate: too clayey	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: low strength	Slight
73000: Pomme-----	Moderate: too clayey	Slight	Slight	Moderate: slope	Slight	Slight
73007: Plato-----	Severe: wetness	Severe: shrink-swell wetness	Severe: shrink-swell wetness	Severe: shrink-swell wetness	Severe: low strength shrink-swell	Moderate: wetness droughty
73010: Wilderness-----	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: slope wetness	Moderate: wetness frost action	Severe: droughty
73013: Lowassie-----	Severe: ponding	Severe: shrink-swell ponding	Severe: shrink-swell ponding	Severe: shrink-swell ponding	Severe: low strength shrink-swell ponding	Severe: ponding

Table 11.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
73014: Clarksville-----	Moderate: slope too clayey	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Severe: small stones
73015: Viraton-----	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness frost action	Moderate: wetness droughty
73016: Viraton-----	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: slope wetness	Moderate: frost action wetness	Moderate: wetness droughty
73017: Bendavis-----	Severe: slope wetness depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope small stones droughty
Poynor-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope small stones droughty
73018: Clarksville-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope small stones
73019: Poynor-----	Moderate: too clayey	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell slope	Slight	Severe: small stones droughty
73020: Poynor-----	Moderate: slope too clayey	Moderate: shrink-swell slope	Moderate: shrink-swell slope	Severe: slope	Moderate: slope	Severe: small stones droughty
73021: Poynor-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope small stones droughty
73022: Alred-----	Moderate: large stones slope too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell slope	Moderate: low strength shrink-swell slope	Severe: small stones droughty
Bardley-----	Severe: depth to rock	Moderate: slope	Severe: depth to rock	Severe: slope	Severe: low strength shrink-swell	Severe: small stones droughty
73023: Mano-----	Severe: wetness	Severe: shrink-swell	Severe: shrink-swell wetness	Severe: shrink-swell	Severe: low strength shrink-swell wetness	Severe: small stones

Table 11.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
73023: Ocie-----	Severe: wetness	Severe: shrink-swell	Severe: shrink-swell wetness	Severe: shrink-swell	Severe: low strength shrink-swell wetness	Severe: small stones
73024: Mano-----	Severe: wetness	Severe: shrink-swell	Severe: shrink-swell wetness	Severe: shrink-swell slope	Severe: low strength shrink-swell wetness	Severe: small stones droughty
Ocie-----	Severe: wetness	Severe: shrink-swell	Severe: shrink-swell wetness	Severe: shrink-swell slope	Severe: low strength shrink-swell wetness	Severe: small stones
73025: Gatewood-----	Severe: wetness depth to rock	Severe: shrink-swell	Severe: wetness depth to rock	Severe: shrink-swell	Severe: low strength shrink-swell wetness	Severe: small stones droughty
Ocie-----	Severe: wetness	Severe: shrink-swell	Severe: shrink-swell wetness depth to rock	Severe: shrink-swell	Severe: low strength shrink-swell wetness	Severe: small stones
73026: Gatewood-----	Severe: wetness depth to rock	Severe: shrink-swell	Severe: shrink-swell wetness depth to rock	Severe: shrink-swell slope	Severe: low strength shrink-swell wetness	Severe: small stones droughty
Ocie-----	Severe: wetness	Severe: shrink-swell	Severe: shrink-swell wetness depth to rock	Severe: shrink-swell slope	Severe: low strength shrink-swell wetness	Moderate: small stones
73027: Gatewood-----	Severe: slope wetness depth to rock	Severe: shrink-swell slope	Severe: shrink-swell slope wetness depth to rock	Severe: shrink-swell slope	Severe: low strength shrink-swell slope wetness	Severe: slope small stones droughty
Ocie-----	Severe: slope depth to rock wetness	Severe: shrink-swell slope	Severe: shrink-swell slope wetness depth to rock	Severe: shrink-swell slope	Severe: low strength shrink-swell slope wetness	Severe: slope small stones
73028: Rueter-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope small stones droughty
Bardley-----	Severe: slope depth to rock	Severe: shrink-swell slope	Severe: shrink-swell slope depth to rock	Severe: shrink-swell slope	Severe: low strength shrink-swell slope	Severe: slope small stones droughty

Table 11.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
73029: Gasconade-----	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: small stones depth to rock droughty
Gatewood-----	Severe: wetness depth to rock	Severe: shrink-swell	Severe: shrink-swell wetness depth to rock	Severe: shrink-swell slope	Severe: low strength shrink-swell wetness	Moderate: small stones droughty
Rock outcrop.						
73030: Gasconade-----	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock droughty
73032: Gatewood-----	Severe: wetness depth to rock	Severe: shrink-swell	Severe: shrink-swell wetness depth to rock	Severe: shrink-swell slope	Severe: low strength shrink-swell wetness	Moderate: large stones small stones droughty
73033: Gatewood-----	Severe: slope wetness depth to rock	Severe: shrink-swell slope	Severe: shrink-swell slope wetness depth to rock	Severe: shrink-swell slope	Severe: low strength shrink-swell slope wetness	Moderate: large stones slope small stones droughty
73051: Winnipeg-----	Slight	Slight	Slight	Slight	Slight	Slight
74626: Tanglenook-----	Severe: wetness	Severe: flooding shrink-swell wetness	Severe: flooding shrink-swell wetness	Severe: flooding shrink-swell wetness	Severe: low strength shrink-swell wetness	Severe: wetness
74627: Hartville-----	Severe: wetness	Severe: flooding shrink-swell wetness	Severe: flooding shrink-swell wetness	Severe: flooding shrink-swell wetness	Severe: low strength shrink-swell wetness	Moderate: wetness
75377: Racket-----	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding
75379: Kaintuck-----	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding
75380: Dapue-----	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding

Table 11.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
75381: Bearthicket-----	Slight	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding low strength	Slight
75382, 75383: Cedargap-----	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding small stones
99000. Pits, quarries						
99001. Water						
99002. Orthents, borrow area, clayey						

Table 12.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
66000: Moniteau-----	Severe: flooding percs slowly wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: wetness
70006: Credon-----	Severe: percs slowly wetness	Severe: wetness	Severe: wetness too clayey	Moderate: wetness	Moderate: small stones wetness too clayey
70020: Blueye-----	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Severe: hard to pack too clayey depth to rock
70021: Moko-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: depth to rock slope	Severe: large stones depth to rock slope
70022: Tonti-----	Severe: percs slowly wetness	Severe: wetness	Severe: too clayey wetness	Moderate: wetness	Moderate: too clayey wetness small stones
71250: Britwater-----	Moderate: flooding percs slowly	Moderate: seepage	Moderate: flooding too clayey	Moderate: flooding	Moderate: too clayey
71251: Britwater-----	Moderate: flooding percs slowly	Moderate: seepage slope	Moderate: flooding too clayey	Moderate: flooding	Moderate: too clayey
73000: Pomme-----	Moderate: percs slowly	Moderate: seepage slope	Moderate: too clayey	Slight	Moderate: too clayey
73007: Plato-----	Severe: percs slowly wetness	Severe: wetness	Severe: too clayey wetness	Severe: wetness	Severe: hard to pack too clayey wetness
73010: Wilderness-----	Severe: percs slowly wetness	Severe: wetness	Severe: too clayey	Moderate: wetness	Severe: small stones too clayey

Table 12.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
73013: Lowassie-----	Severe: percs slowly ponding	Severe: ponding	Severe: too clayey ponding	Severe: ponding	Severe: hard to pack too clayey ponding
73014: Clarksville-----	Moderate: slope	Severe: seepage slope	Moderate: slope too clayey	Severe: seepage	Severe: small stones too clayey
73015, 73016: Viraton-----	Severe: percs slowly wetness	Severe: wetness	Severe: wetness too clayey	Moderate: wetness	Severe: small stones too clayey
73017: Bendavis-----	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope small stones depth to rock
Poynor-----	Severe: slope	Severe: slope	Severe: slope too clayey	Severe: slope	Severe: slope small stones too clayey
73018: Clarksville-----	Severe: slope	Severe: seepage slope	Severe: slope	Severe: seepage slope	Severe: slope small stones
73019: Poynor-----	Moderate: percs slowly	Moderate: seepage slope	Severe: too clayey	Slight	Severe: small stones too clayey
73020: Poynor-----	Moderate: percs slowly slope	Severe: slope	Severe: too clayey	Moderate: slope	Severe: small stones too clayey
73021: Poynor-----	Severe: slope	Severe: slope	Severe: slope too clayey	Severe: slope	Severe: slope small stones too clayey
73022: Alred-----	Severe: percs slowly	Severe: slope	Severe: too clayey	Moderate: slope	Severe: hard to pack small stones too clayey
Bardley-----	Severe: percs slowly depth to rock	Severe: slope depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Severe: hard to pack too clayey depth to rock

Table 12.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
73023: Mano-----	Severe: percs slowly wetness	Severe: wetness	Severe: too clayey	Moderate: wetness	Severe: hard to pack small stones too clayey
Ocie-----	Severe: percs slowly wetness	Severe: wetness	Severe: too clayey depth to rock	Moderate: wetness depth to rock	Severe: hard to pack small stones too clayey
73024: Mano-----	Severe: percs slowly wetness	Severe: slope wetness	Severe: too clayey	Moderate: slope wetness	Severe: hard to pack small stones too clayey
Ocie-----	Severe: percs slowly wetness	Severe: slope wetness	Severe: too clayey depth to rock	Moderate: slope wetness depth to rock	Severe: hard to pack small stones too clayey
73025: Gatewood-----	Severe: percs slowly wetness depth to rock	Severe: wetness depth to rock	Severe: too clayey wetness depth to rock	Severe: depth to rock	Severe: hard to pack too clayey depth to rock
Ocie-----	Severe: percs slowly wetness	Severe: wetness	Severe: too clayey wetness depth to rock	Moderate: wetness depth to rock	Severe: hard to pack small stones too clayey
73026: Gatewood-----	Severe: percs slowly wetness depth to rock	Severe: slope wetness depth to rock	Severe: too clayey wetness depth to rock	Severe: depth to rock	Severe: hard to pack too clayey depth to rock
Ocie-----	Severe: percs slowly wetness	Severe: slope wetness	Severe: too clayey depth to rock	Moderate: slope wetness depth to rock	Severe: hard to pack small stones too clayey
73027: Gatewood-----	Severe: percs slowly slope wetness depth to rock	Severe: slope wetness depth to rock	Severe: slope too clayey wetness depth to rock	Severe: slope depth to rock	Severe: hard to pack slope too clayey depth to rock
Ocie-----	Severe: percs slowly slope wetness	Severe: slope wetness	Severe: slope too clayey depth to rock	Severe: slope	Severe: hard to pack slope too clayey
73028: Rueter-----	Severe: slope	Severe: seepage slope	Severe: slope	Severe: seepage slope	Severe: slope small stones

Table 12.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
73028: Bardley-----	Severe: percs slowly slope depth to rock	Severe: slope depth to rock	Severe: slope too clayey depth to rock	Severe: slope depth to rock	Severe: hard to pack slope too clayey depth to rock
73029: Gasconade-----	Severe: percs slowly depth to rock	Severe: slope depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Severe: small stones too clayey depth to rock
Gatewood-----	Severe: percs slowly wetness depth to rock	Severe: slope wetness depth to rock	Severe: too clayey wetness depth to rock	Severe: depth to rock	Severe: hard to pack too clayey depth to rock
Rock outcrop.					
73030: Gasconade-----	Severe: large stones percs slowly slope depth to rock	Severe: large stones slope depth to rock	Severe: slope too clayey depth to rock	Severe: slope depth to rock	Severe: large stones slope depth to rock
73032: Gatewood-----	Severe: percs slowly wetness depth to rock	Severe: large stones slope wetness depth to rock	Severe: too clayey wetness depth to rock	Severe: depth to rock	Severe: hard to pack too clayey depth to rock
73033: Gatewood-----	Severe: percs slowly slope wetness depth to rock	Severe: large stones slope wetness depth to rock	Severe: slope too clayey wetness depth to rock	Severe: slope depth to rock	Severe: hard to pack slope too clayey depth to rock
73051: Winnipeg-----	Moderate: percs slowly	Moderate: seepage slope	Moderate: too clayey	Slight	Moderate: too clayey
74626: Tanglenook-----	Severe: percs slowly wetness	Severe: wetness	Severe: too clayey wetness	Severe: wetness	Severe: hard to pack too clayey wetness
74627: Hartville-----	Severe: percs slowly wetness	Severe: wetness	Severe: too clayey wetness	Severe: wetness	Severe: hard to pack too clayey wetness

Table 12.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
75377: Racket-----	Severe: flooding	Severe: flooding seepage	Severe: flooding seepage wetness	Severe: flooding seepage	Slight
75379: Kaintuck-----	Severe: flooding poor filter	Severe: flooding seepage	Severe: flooding seepage	Severe: flooding seepage	Slight
75380: Dapue-----	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: too clayey
75381: Bearthicket-----	Moderate: flooding percs slowly	Moderate: seepage	Moderate: flooding too clayey	Moderate: flooding	Moderate: too clayey
75382, 75383: Cedargap-----	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: small stones
99000. Pits, quarries					
99001. Water					
99002. Orthents, borrow area, clayey					

Table 13.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
66000: Moniteau-----	Poor: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
70006: Credon-----	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim too clayey
70020: Blueye-----	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones too clayey
70021: Moko-----	Poor: large stones slope depth to rock	Improbable: large stones excess fines	Improbable: large stones excess fines	Poor: large stones slope depth to rock
70022: Tonti-----	Fair: low strength shrink-swell wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim small stones
71250, 71251: Britwater-----	Fair: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim too clayey
73000: Pomme-----	Fair: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim too clayey
73007: Plato-----	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim too clayey
73010: Wilderness-----	Fair: low strength shrink-swell	Improbable: small stones excess fines	Improbable: excess fines	Poor: area reclaim small stones
73013: Lowassie-----	Poor: low strength shrink-swell wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey wetness
73014: Clarksville-----	Good	Improbable: small stones excess fines	Improbable: excess fines	Poor: area reclaim small stones

Table 13.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
73015, 73016: Viraton-----	Fair: shrink-swell wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim small stones
73017: Bendavis-----	Poor: slope depth to rock	Improbable: small stones excess fines	Improbable: excess fines	Poor: slope small stones
Poynor-----	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
73018: Clarksville-----	Poor: slope	Improbable: small stones excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
73019, 73020: Poynor-----	Fair: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: small stones
73021: Poynor-----	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
73022: Alred-----	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: small stones
Bardley-----	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones too clayey
73023, 73024: Mano-----	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: small stones too clayey
Ocie-----	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: small stones too clayey
73025, 73026: Gatewood-----	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones too clayey
Ocie-----	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: small stones too clayey

Table 13.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
73027: Gatewood-----	Poor: low strength shrink-swell slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones too clayey
Ocie-----	Poor: low strength shrink-swell slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones too clayey
73028: Rueter-----	Poor: slope	Improbable: small stones excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
Bardley-----	Poor: shrink-swell slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope too clayey
73029: Gasconade-----	Poor: large stones depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones too clayey depth to rock
Gatewood-----	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones too clayey
Rock outcrop.				
73030: Gasconade-----	Poor: large stones slope depth to rock	Improbable: large stones excess fines	Improbable: large stones excess fines	Poor: large stones slope too clayey depth to rock
73032: Gatewood-----	Poor: large stones low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones too clayey
73033: Gatewood-----	Poor: large stones low strength shrink-swell slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones too clayey
73051: Winnipeg-----	Fair: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim too clayey

Table 13.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
74626: Tanglenook-----	Poor: low strength shrink-swell wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey wetness
74627: Hartville-----	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
75377: Racket-----	Good	Improbable: excess fines	Probable	Fair: area reclaim
75379: Kaintuck-----	Good	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim too sandy
75380: Dapue-----	Fair: low strength	Improbable: excess fines	Improbable: excess fines	Good
75381: Bearthicket-----	Fair: low strength	Improbable: excess fines	Improbable: excess fines	Good
75382, 75383: Cedargap-----	Good	Improbable: excess fines	Probable	Poor: area reclaim small stones
99000. Pits, quarries				
99001. Water				
99002. Orthents, borrow area, clayey				

Table 14.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
66000: Moniteau-----	Slight	Severe: wetness	Severe: slow refill	Limitation: flooding frost action	Limitation: erodes easily flooding wetness	Limitation: erodes easily wetness	Limitation: erodes easily wetness
70006: Credon-----	Moderate: seepage	Moderate: wetness	Severe: no water	Limitation: percs slowly	Limitation: percs slowly rooting depth wetness	Limitation: erodes easily rooting depth wetness	Limitation: erodes easily percs slowly rooting depth
70020: Blueye-----	Moderate: slope depth to rock	Severe: hard to pack	Severe: no water	Limitation: depth to rock slope deep to water	Limitation: percs slowly slope depth to rock droughty	Limitation: erodes easily slope depth to rock	Limitation: erodes easily slope depth to rock droughty
70021: Moko-----	Severe: slope depth to rock	Severe: large stones thin layer	Severe: no water	Limitation: depth to rock slope	Limitation: large stones slope depth to rock droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock droughty
70022: Tonti-----	Moderate: seepage slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: erodes easily percs slowly rooting depth	Limitation: erodes easily rooting depth droughty
71250: Britwater-----	Moderate: seepage	Moderate: hard to pack piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily	Limitation: erodes easily	Limitation: erodes easily
71251: Britwater-----	Moderate: seepage slope	Moderate: hard to pack piping	Severe: no water	Limitation: deep to water slope	Limitation: erodes easily slope	Limitation: erodes easily	Limitation: erodes easily
73000: Pomme-----	Moderate: seepage slope	Moderate: hard to pack piping	Severe: no water	Limitation: deep to water slope	Limitation: erodes easily slope	Limitation: erodes easily	Limitation: erodes easily
73007: Plato-----	Moderate: seepage	Moderate: hard to pack wetness	Severe: no water	Limitation: percs slowly frost action	Limitation: erodes easily wetness droughty	Limitation: erodes easily rooting depth wetness	Limitation: erodes easily rooting depth wetness
73010: Wilderness-----	Moderate: seepage slope	Moderate: wetness	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth wetness	Limitation: rooting depth droughty

Table 14.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
73013: Lowassie-----	Slight	Severe: ponding	Severe: no water	Limitation: percs slowly ponding frost action	Limitation: erodes easily percs slowly ponding	Limitation: erodes easily ponding	Limitation: erodes easily percs slowly wetness
73014: Clarksville-----	Severe: seepage slope	Slight	Severe: no water	Limitation: slope deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope droughty
73015: Viraton-----	Moderate: seepage slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope	Limitation: wetness droughty	Limitation: erodes easily rooting depth wetness	Limitation: erodes easily rooting depth droughty
73016: Viraton-----	Moderate: seepage slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: erodes easily rooting depth wetness	Limitation: erodes easily rooting depth droughty
73017: Bendavis-----	Severe: slope	Severe: thin layer	Severe: no water	Limitation: slope depth to rock deep to water	Limitation: slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock droughty
Poynor-----	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: slope deep to water	Limitation: slope droughty	Limitation: large stones slope	Limitation: large stones slope droughty
73018: Clarksville-----	Severe: seepage slope	Slight	Severe: no water	Limitation: slope deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope droughty
73019: Poynor-----	Moderate: seepage slope	Severe: hard to pack	Severe: no water	Limitation: slope deep to water	Limitation: slope droughty	Favorable	Limitation: droughty
73020, 73021: Poynor-----	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: slope deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope droughty
73022: Alred-----	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope deep to water	Limitation: slope droughty	Limitation: percs slowly slope	Limitation: slope droughty
Bardley-----	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope depth to rock deep to water	Limitation: slope depth to rock droughty	Limitation: slope depth to rock	Limitation: slope depth to rock droughty

Table 14.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
73023: Mano-----	Moderate: slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope	Limitation: percs slowly slope droughty	Limitation: percs slowly wetness	Limitation: percs slowly droughty
Ocie-----	Moderate: depth to rock slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope	Limitation: percs slowly slope droughty	Limitation: percs slowly wetness	Limitation: percs slowly droughty
73024: Mano-----	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope	Limitation: percs slowly slope droughty	Limitation: percs slowly slope wetness	Limitation: percs slowly slope droughty
Ocie-----	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope	Limitation: percs slowly slope droughty	Limitation: percs slowly slope wetness	Limitation: percs slowly slope droughty
73025: Gatewood-----	Moderate: slope depth to rock	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope depth to rock	Limitation: percs slowly slope depth to rock droughty	Limitation: percs slowly wetness depth to rock	Limitation: percs slowly depth to rock droughty
Ocie-----	Moderate: depth to rock slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope	Limitation: percs slowly slope droughty	Limitation: percs slowly wetness	Limitation: percs slowly droughty
73026: Gatewood-----	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope depth to rock	Limitation: percs slowly slope depth to rock droughty	Limitation: percs slowly slope wetness	Limitation: percs slowly slope depth to rock droughty
Ocie-----	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope	Limitation: percs slowly slope droughty	Limitation: slope wetness depth to rock	Limitation: percs slowly slope droughty
73027: Gatewood-----	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope depth to rock	Limitation: percs slowly slope droughty	Limitation: slope wetness depth to rock	Limitation: percs slowly slope depth to rock droughty
Ocie-----	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope	Limitation: percs slowly slope droughty	Limitation: percs slowly slope wetness	Limitation: percs slowly slope droughty
73028: Rueter-----	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: slope deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope droughty

Table 14.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
73028: Bardley-----	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope depth to rock	Limitation: percs slowly slope droughty	Limitation: percs slowly slope depth to rock	Limitation: percs slowly slope depth to rock droughty
73029: Gasconade-----	Severe: slope depth to rock	Severe: thin layer	Severe: no water	Limitation: depth to rock slope	Limitation: slope depth to rock droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock droughty
Gatewood-----	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope depth to rock	Limitation: percs slowly slope droughty	Limitation: percs slowly slope wetness depth to rock	Limitation: percs slowly slope depth to rock droughty
Rock outcrop.							
73030: Gasconade-----	Severe: slope depth to rock	Severe: large stones thin layer	Severe: no water	Limitation: slope depth to rock	Limitation: large stones slope depth to rock droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock droughty
73032: Gatewood-----	Severe: slope	Severe: hard to pack large stones	Severe: no water	Limitation: percs slowly slope depth to rock	Limitation: percs slowly slope droughty wetness	Limitation: percs slowly slope wetness depth to rock	Limitation: large stones percs slowly slope depth to rock droughty
73033: Gatewood-----	Severe: slope	Severe: hard to pack large stones	Severe: no water	Limitation: percs slowly slope depth to rock	Limitation: percs slowly slope wetness droughty	Limitation: percs slowly slope wetness depth to rock	Limitation: large stones percs slowly slope depth to rock droughty
73051: Winnipeg-----	Moderate: seepage	Moderate: piping	Severe: no water	Limitation: deep to water slope	Limitation: erodes easily slope	Limitation: erodes easily	Limitation: erodes easily
74626: Tanglenook-----	Slight	Severe: hard to pack wetness	Severe: slow refill	Limitation: percs slowly frost action	Limitation: percs slowly wetness	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly wetness
74627: Hartville-----	Slight	Severe: hard to pack	Severe: no water	Limitation: percs slowly frost action	Limitation: percs slowly wetness	Limitation: erodes easily wetness	Limitation: erodes easily percs slowly

Table 14.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
75377: Racket-----	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: flooding	Favorable	Favorable
75379: Kaintuck-----	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: flooding	Favorable	Favorable
75380: Dapue-----	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily flooding	Limitation: erodes easily	Limitation: erodes easily
75381: Bearthicket-----	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily	Limitation: erodes easily	Limitation: erodes easily
75382, 75383: Cedargap-----	Moderate: seepage	Moderate: seepage	Severe: no water	Limitation: deep to water	Limitation: flooding droughty	Favorable	Limitation: droughty
99000. Pits, quarries							
99001. Water							
99002. Orthents, borrow area, clayey							

(The symbol > means more than. Absence of an entry indicates that the data were not estimated.)

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Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing				Plasticity	
			Unified	AASHTO	>10 inches	3-10 inches	sieve number--				Liquid limit	Plasticity index
	In				Pct	Pct	4	10	40	200	Pct	
70022: Tonti-----	0-8	Silt loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0-5	80-100	75-100	70-95	65-85	20-35	4-15
	8-20	Gravelly silty clay loam, gravelly silt loam, silty clay loam	CL, GC, SC	A-4, A-6	0	0-5	65-100	60-100	55-100	45-95	25-40	8-20
	20-34	Extremely gravelly silt loam, very gravelly silty clay loam	CL, GC, SC	A-2, A-4, A-6	0-5	0-10	25-55	20-50	15-50	15-40	25-40	7-20
	34-80	Extremely gravelly silty clay, very gravelly clay	CH, CL, SC, GC	A-2, A-7	0-5	0-10	15-65	10-60	10-55	5-50	45-80	25-50
71250, 71251: Britwater-----	0-6	Silt loam	CL, CL-ML	A-4	0	0	80-100	75-100	70-95	50-75	0-30	6-10
	6-22	Gravelly silty clay loam, gravelly silt loam, silty clay loam, silt loam	GC, CL, SC	A-4, A-6	0	0	60-100	55-95	50-90	45-85	23-38	8-15
	22-80	Very gravelly silty clay loam, very gravelly clay loam, gravelly clay	CL, GC, SC	A-2, A-6, A-7	0	0-5	30-60	25-55	20-50	15-45	30-50	10-25
73000: Pomme-----	0-7	Silt loam	CL, CL-ML	A-4, A-6	0	0	80-100	75-100	70-95	50-90	21-30	6-10
	7-19	Silty clay loam, gravelly silt loam, gravelly silty clay loam	CL	A-4, A-6	0	0-10	70-95	65-90	50-85	50-75	27-40	9-15
	19-57	Very gravelly silty clay loam, very cobbly silty clay loam	GC	A-6, A-2, A-7-6	0	0-30	30-50	30-45	25-45	20-40	32-45	15-25
	57-86	Extremely gravelly clay, very cobbly clay	GC, GM	A-2, A-6, A-7-5	0	0-45	20-45	20-45	20-45	15-40	37-61	15-30

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
73007: Plato-----	0-6	Silt loam	CL-ML, ML	A-4	0	0	100	95-100	90-100	70-90	15-25	NP-6
	6-29	Silty clay loam, silty clay, clay	CH, CL	A-7	0	0	85-100	80-100	75-95	65-85	35-50	15-25
	29-46	Extremely gravelly silt loam, very gravelly silt loam, very gravelly silty clay loam	GC, GC-GM	A-1-b, A-4, A-6	0	0-15	25-55	20-50	15-45	15-40	25-40	5-20
	46-80	Very gravelly clay, gravelly clay, gravelly silty clay loam	CL, CH, GC, SC	A-7	0	0-20	40-75	40-70	35-70	30-60	45-60	30-45
73010: Wilderness-----	0-6	Gravelly silt loam	GC, CL-ML, SC, SC-SM	A-2-4, A-4	0	0-10	55-85	50-75	45-70	40-65	20-30	5-10
	6-17	Very gravelly silty clay loam, extremely gravelly silty clay loam, very gravelly silt loam	GC, SC	A-2-6, A-6	0-5	0-15	25-55	20-50	15-50	15-40	25-40	10-20
	17-38	Very gravelly silt loam, very gravelly silty clay loam, extremely gravelly silt loam	GC, GP-GC, GC-GM	A-2-4, A-1, A-2-6	0-5	0-20	20-50	15-45	10-40	5-35	20-40	5-15
	38-80	Gravelly clay, clay, very gravelly clay, extremely gravelly silty clay	CL	A-6	0	0-10	15-65	10-60	10-55	5-50	25-40	15-25
73013: Lowassie-----	0-10	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	85-100	20-35	5-15
	10-18	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	85-100	25-40	5-20
	18-36	Silty clay, clay	CH	A-7	0	0	100	100	90-100	85-95	50-70	25-40
	36-80	Silt loam, silty clay loam		A-6, A-7	0	0	95-100	90-100	85-100	80-90	30-45	10-25

Table 15.--Engineering Index Properties--Continued

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Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing				Liquidity limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
73017: Poynor-----	0-4	Very gravelly silt loam	GC, GC-GM, GM	A-1, A-4, A-2-4	0-5	0-20	30-55	25-50	20-45	20-40	20-30	2-8
	4-10	Very gravelly loam, very gravelly silt loam	GC, GM, GC-GM	A-1-b, A-2-4, A-4	0-5	0-20	25-55	25-50	20-50	15-40	20-30	2-8
	10-28	Very gravelly silt loam, very gravelly clay loam	GC	A-2-6, A-6	0-5	0-20	25-55	25-50	20-50	15-45	25-40	10-20
	28-80	Silty clay, clay	CH, MH	A-7	0	0-10	95-100	90-100	85-95	70-90	51-80	25-40
73018: Clarksville-----	0-3	Very gravelly silt loam	GP-GC, GC, SC, SC-SM	A-1-a, A-2-6, A-2-4	0-5	0-15	15-70	25-60	5-50	5-45	13-40	NP-15
	3-13	Very gravelly silt loam, extremely gravelly silt loam	GC, SP-SC, GP-GC, SC	A-2-6, A-6	0-5	0-15	15-70	10-60	5-50	5-45	15-40	5-15
	13-47	Very gravelly silt loam, very gravelly silty clay loam, extremely gravelly clay loam	GC, SP-SC, GP-GC, SC	A-2-7, A-7	0-5	0-25	25-70	20-60	15-50	10-45	35-55	25-45
	47-80	Very cobbly clay, very gravelly clay, extremely gravelly silty clay	GC, CH	A-2-7, A-7	0-15	0-15	25-75	20-70	15-65	10-60	55-75	35-55
73019: Poynor-----	0-4	Very gravelly silt loam	GC, GM, GC-GM	A-1, A-2-4, A-4	0-5	0-20	30-55	25-50	20-45	20-40	20-30	2-8
	4-10	Very gravelly silt loam, gravelly silt loam	GC-GM, GC, GM	A-1-b, A-2-4, A-4	0-5	0-20	25-55	20-50	20-50	15-40	20-30	2-8
	10-28	Very gravelly silty clay loam, extremely gravelly silt loam	GC	A-2-6, A-6	0-5	0-20	25-55	20-50	20-50	15-45	25-40	10-20
	28-80	Gravelly clay, clay	CH, MH	A-7	0	0-10	95-100	80-100	85-95	70-90	51-70	25-35

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	sieve number--					
	In				Pct	Pct	4	10	40	200	Pct	
73020: Poynor-----	0-4	Very gravelly silt loam	GC-GM, GC, GM	A-1, A-2-4, A-4	0-5	0-20	30-55	25-50	20-45	20-40	20-30	2-8
	4-10	Very gravelly silt loam, extremely gravelly silt loam	GC-GM, GC, GM	A-1-b, A-4, A-2-4	0-5	0-20	25-55	20-50	20-50	15-40	20-30	2-8
	10-28	Very gravelly silty clay loam, extremely gravelly silt loam	GC	A-2-6, A-6	0-5	0-20	25-55	20-50	20-50	15-45	25-40	10-20
	28-80	Clay, cobbly clay	CH, MH	A-7	0	0-10	95-100	80-100	85-95	70-90	51-70	25-35
73021: Poynor-----	0-4	Very gravelly silt loam	GC, GM, GC-GM	A-1, A-2-4, A-4	0-5	0-20	30-55	25-50	20-45	20-40	20-30	2-8
	4-10	Very gravelly silt loam	GC, GM, GC-GM	A-1-b, A-2-4, A-4	0-5	0-20	25-55	20-50	20-50	15-40	20-30	2-8
	10-28	Very gravelly silty clay loam, very gravelly silt loam	GC	A-2-6, A-6	0-5	0-20	25-55	20-50	20-50	15-45	25-40	10-20
	28-80	Clay, cobbly clay	CH, MH	A-7	0	0-10	95-100	80-100	85-95	70-90	51-80	25-40
73022: Alred-----	0-4	Very gravelly silt loam	GC, GC-GM	A-2, A-4, A-6	0	0-15	35-60	25-50	20-45	15-40	20-30	5-10
	4-27	Very gravelly silty clay loam, very gravelly silt loam, extremely gravelly silt loam	GC	A-2, A-4, A-6	0	0-25	25-55	20-50	15-45	15-40	25-38	8-15
	27-80	Clay, cobbly clay, gravelly clay	CH	A-7	0	0-30	60-100	55-100	50-95	50-85	50-80	30-45
Bardley-----	0-4	Very gravelly silt loam	CL, CL-ML, SC, GC	A-4, A-6	0-5	0-15	60-90	25-50	50-70	45-65	25-35	5-15
	4-8	Extremely gravelly silt loam, very gravelly silt loam	GC, GP-GC	A-2	0-5	0-15	15-30	10-30	5-25	5-25	35-45	15-20
	8-27	Clay, gravelly clay	GM, MH, SM	A-7	0	0-10	70-95	50-95	50-90	40-85	50-70	20-35
	27-80	Unweathered bedrock			---	---	---	---	---	---	---	---

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Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing				Liquid	Plas-
			Unified	AASHTO	>10	3-10	sieve number--				limit	ticity
					inches	inches	4	10	40	200		index
	In				Pct	Pct					Pct	
73025: Gatewood-----	0-2	Gravelly silt loam	CL, GC, SC	A-2, A-4, A-6	0	0-15	55-80	50-75	45-70	40-65	25-35	5-15
	2-5	Very gravelly silt loam, gravelly silt loam	GC, CL, SC	A-4, A-2, A-6	0	0-15	40-90	35-85	30-75	30-70	25-35	5-15
	5-36	Clay, gravelly clay	CH	A-7	0-5	0-10	80-95	60-90	55-90	50-85	55-75	30-45
	36-80	Unweathered bedrock			---	---	---	---	---	---	---	---
Ocic-----	0-5	Very gravelly silt loam	CL, SC-SM, CL-ML, SC	A-1, A-2, A-4	0	0-15	45-80	40-50	30-65	20-60	0-25	5-10
	5-11	Very gravelly silt loam	GC, GC-GM	A-1-b, A-2-4, A-2-6	0-5	0-20	40-55	30-50	20-45	15-35	20-30	5-15
	11-24	Very gravelly silt loam, very gravelly silty clay loam	GC, GC-GM	A-1-b, A-2-4, A-2-6	0-5	0-20	40-55	20-50	20-45	15-35	20-30	5-15
	24-56	Clay, gravelly clay	CH	A-7	0-5	0-15	75-95	70-90	65-85	60-80	50-70	30-40
	56-80	Unweathered bedrock			---	---	---	---	---	---	---	---
73026: Gatewood-----	0-2	Very gravelly silt loam	CL, CL-ML, ML, GC	A-6, A-2-6, A-2-7	0	0-10	35-95	40-60	35-55	30-50	20-40	10-20
	2-5	Very gravelly silt loam	GC, GM	A-1-b, A-2-6, A-2-7	0	0-10	40-95	35-60	30-55	25-50	20-40	10-20
	5-36	Gravelly clay, clay	GC, CH	A-7	0-10	0-10	25-95	60-85	55-80	50-75	50-80	30-50
	36-80	Unweathered bedrock			---	---	---	---	---	---	---	---
Ocic-----	0-5	Very gravelly silt loam	CL, GC, SC	A-2, A-4, A-6	0	0-15	55-80	40-60	35-55	30-50	25-35	5-15
	5-11	Very gravelly silt loam, extremely gravelly silt loam	CL, SC, GC	A-4, A-2, A-6	0	0-15	40-90	35-60	30-55	30-50	25-35	5-15
	11-24	Very gravelly silt loam, extremely gravelly silt loam, very gravelly silty clay loam	GC, GC-GM	A-1-b, A-2-4, A-2-6	0-5	0-20	40-55	20-50	20-45	15-35	20-30	5-15
	24-56	Clay, gravelly clay	CH	A-7	0-5	0-10	80-95	60-90	55-90	50-85	55-75	30-45
	56-80	Unweathered bedrock			---	---	---	---	---	---	---	---
73027: Gatewood-----	0-2	Very gravelly silt loam	GC, CL, GP-GC, SC	A-4, A-2, A-6	0-5	5-15	30-80	40-60	35-55	30-50	25-35	5-15
	2-5	Very gravelly silt loam	GC, GM	A-1-b, A-2-6, A-2-7	0	5-15	40-95	35-70	30-65	25-60	20-40	10-20
	5-36	Clay, gravelly clay	CH	A-7	0-5	0-10	80-95	60-90	55-90	50-85	55-75	30-45
	36-80	Unweathered bedrock			---	---	---	---	---	---	---	---

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Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquidity limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
73029: Gatewood-----	0-2	Very gravelly silt loam	CL, GC, SC	A-2, A-4, A-6	0	0-15	55-80	40-60	35-55	30-45	25-35	5-15
	2-5	Gravelly silt loam, very gravelly silt loam	CL, GC, SC	A-4, A-2, A-6	0	0-15	40-90	35-85	30-75	30-70	25-35	5-15
	5-36	Gravelly clay, clay	CH	A-7	0-5	0-10	80-95	60-90	55-90	50-85	55-75	30-45
	36-80	Unweathered bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			---	---	---	---	---	---	---	---
73030: Gasconade-----	0-7	Very gravelly clay loam	CL	A-6	5-15	35-75	75-90	70-85	60-75	55-65	30-40	15-25
	7-14	Very gravelly clay, very flaggy silty clay	GC	A-2-7	0-10	10-70	45-55	40-50	30-40	20-35	55-65	35-45
	14-80	Unweathered bedrock			---	---	---	---	---	---	---	---
73032: Gatewood-----	0-2	Very gravelly silt loam	CL, SC, GC	A-4, A-2, A-6	0	0-15	55-80	35-55	30-50	30-45	25-35	5-15
	2-5	Very gravelly silt loam, gravelly silt loam	CL, GC, SC	A-2, A-4, A-6	0	0-15	40-90	35-85	30-75	30-70	25-35	5-15
	5-36	Clay, gravelly clay	CH	A-7	0-5	0-10	80-95	60-90	55-90	50-85	55-75	30-45
	36-80	Unweathered bedrock			---	---	---	---	---	---	---	---
73033: Gatewood-----	0-2	Extremely gravelly silt loam	CL, GC, SC	A-2, A-6, A-4	0	0-15	55-80	20-30	15-30	10-25	25-35	5-15
	2-5	Very gravelly silt loam, gravelly silt loam	CL, GC, SC	A-2, A-4, A-6	0	0-15	40-90	35-85	30-75	30-70	25-35	5-15
	5-36	Clay, cobbly clay	CH	A-7	0-5	0-10	80-95	60-90	55-90	50-85	55-75	30-45
	36-80	Unweathered bedrock			---	---	---	---	---	---	---	---
73051: Winnipeg-----	0-6	Silt loam	CL	A-4	0	0	95-100	90-100	85-95	75-85	25-35	5-15
	6-16	Silt loam, silty clay loam	CL	A-6	0	0	95-100	90-100	85-95	80-90	30-40	10-20
	16-44	Silty clay loam, silt loam	CL	A-6	0	0	90-100	75-100	60-95	55-90	35-45	15-25
	44-80	Gravelly silty clay loam, very gravelly silty clay loam	GC, SC	A-2-6, A-6	0	0	45-100	35-100	35-95	30-85	34-70	15-45

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth In	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
					Pct	Pct					Pct	
74626: Tanglenook-----	0-6	Silt loam	CL	A-4	0	0	100	100	95-100	80-90	27-32	5-10
	6-17	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	95-100	85-90	35-45	15-25
	17-30	Silty clay, silty clay loam	CH, CL	A-7	0	0	100	100	95-100	95-100	45-55	25-35
	30-56	Silty clay, silty clay loam	CH, CL	A-7	0	0	100	100	95-100	95-100	45-55	25-35
	56-80	Silty clay, clay, silty clay loam	CH, CL	A-7	0	0	100	100	95-100	95-100	45-55	25-35
74627: Hartville-----	0-7	Silt loam	CL, ML	A-4, A-6	0	0	95-100	90-100	80-95	70-90	15-30	5-15
	7-11	Silt loam	CL	A-6, A-7	0	0	95-100	90-100	85-100	75-90	15-30	15-25
	11-40	Silty clay, silty clay loam	CH	A-7	0	0	95-100	85-100	80-100	75-95	50-60	30-40
	40-80	Silty clay loam	SC, GC, CH	A-7	0	0	85-95	75-95	65-100	60-95	40-50	25-40
75377: Racket-----	0-21	Silt loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	75-95	55-85	25-35	5-15
	21-42	Silt loam, loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	75-95	55-95	25-40	5-20
	42-80	Stratified extremely gravelly sand to gravelly loamy sand	GM, SP-SM, GP-GM, SM	A-1	0	0-15	30-65	20-65	10-50	5-20	15-30	NP-5
75379: Kaintuck-----	0-6	Loam	ML, CL-ML, SC-SM, SM	A-4	0	0	95-100	85-100	75-95	60-75	0-20	NP-5
	6-45	Stratified fine sandy loam to silt loam	CL-ML, GM, SM, ML	A-2, A-4	0	0	95-100	85-100	70-90	40-55	0-20	NP-5
	45-80	Stratified loamy sand to fine sandy loam	GM, CL-ML, ML, SM	A-1, A-4, A-2	0	0	80-100	75-100	40-60	15-25	0-20	NP-5
75380: Dapue-----	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	95-100	95-100	85-100	60-95	25-40	5-15
	9-15	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	95-100	95-100	85-100	60-95	25-40	5-15
	15-80	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	95-100	95-100	85-100	60-95	25-40	5-15
75381: Bearthicket-----	0-10	Silt loam	CL, CL-ML, ML	A-4	0	0	100	95-100	90-100	75-90	25-35	3-10
	10-48	Silt loam, silty clay loam	CL-ML, CL, ML	A-4, A-6	0	0	100	95-100	90-100	80-90	25-40	5-15
	48-80	Silt loam, silty clay loam	CL-ML, CL, ML	A-4, A-6	0	0	95-100	85-100	80-100	75-95	25-40	5-15

Table 15.--Engineering Index Properties--Continued

[illegible]

Table 16.--Physical and Chemical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the top layer. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Cation exchange capacity	Effective cation exchange capacity	Soil reaction	Shrink- swell potential	Organic matter	Erosion factors		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	meq/100g	meq/100g	pH	Pct	Pct	Kw	Kf	T
66000: Moniteau-----	0-7	2-12	61-82	15-27	1.20-1.40	4.00-14.00	0.21-0.23	10-14	7.0-12	5.1-6.5	0.1-2.9	1.0-2.0	.37	.37	5
	7-14	2-13	62-86	12-25	1.20-1.40	4.00-14.00	0.18-0.22	6.0-12	4.0-8.0	5.1-6.5	0.1-2.9	0.5-1.0	.37	.37	
	14-80	5-15	50-73	22-35	1.30-1.50	1.40-4.00	0.17-0.20	12-20	10-14	4.5-6.0	3.0-5.9	0.1-0.8	.43	.43	
70006: Creldon-----	0-10	6-15	60-84	10-25	1.20-1.40	4.00-14.00	0.22-0.24	12-18	6.0-15	4.5-7.3	0.1-2.9	1.0-3.0	.32	.32	4
	10-26	7-17	33-63	30-50	1.30-1.50	1.40-4.00	0.12-0.17	15-35	10-28	4.5-6.5	3.0-5.9	1.0-2.0	.32	.32	
	26-33	9-18	43-71	20-35	1.60-1.90	0.01-0.42	0.07-0.12	8.0-17	7.0-20	3.6-5.5	0.1-2.9	0.1-0.5	.43	.43	
	33-41	9-25	40-76	15-35	1.60-1.85	0.01-0.42	0.05-0.12	6.0-17	4.0-10	3.6-6.0	0.1-2.9	0.1-0.5	.43	.43	
	41-80	5-15	15-55	40-70	1.30-1.55	0.42-1.40	0.04-0.10	25-40	15-35	4.5-6.5	6.0-8.9	0.1-0.5	.32	.32	
70020: Blueye-----	0-9	15-25	45-70	15-27	1.20-1.30	4.00-14.00	0.10-0.16	20-30	5.0-25	6.1-7.8	0.1-2.9	2.0-4.0	.32	.32	2
	9-14	18-30	35-67	15-35	1.25-1.40	4.00-14.00	0.08-0.14	15-30	10-25	6.1-8.4	0.1-2.9	1.0-3.0	.37	.43	
	14-39	5-25	5-55	40-70	1.20-1.45	0.42-1.40	0.04-0.09	25-50	20-45	6.6-8.4	6.0-8.9	1.0-3.0	.24	.32	
	39-80	---	---	---	---	0.00-0.00	---	---	---	---	---	---	---	---	
70021: Moko-----	0-2	30-50	20-55	15-30	1.25-1.50	4.00-14.00	0.08-0.13	15-25	2.0-6.0	6.6-7.8	0.1-2.9	4.0-10	.24	.37	1
	2-10	30-50	15-52	18-35	1.25-1.60	4.00-14.00	0.03-0.14	18-32	2.0-6.0	6.6-7.8	0.1-2.9	3.0-8.0	.28	.43	
	10-80	---	---	---	---	---	---	---	---	---	---	---	---	---	
70022: Tonti-----	0-8	8-20	60-82	10-20	1.30-1.50	4.00-14.00	0.15-0.20	5.0-15	4.0-10	5.0-6.5	0.1-2.9	1.0-4.0	.37	.43	4
	8-20	6-18	47-74	20-35	1.30-1.50	4.00-14.00	0.12-0.18	12-22	10-25	3.6-6.0	0.1-2.9	0.1-1.0	.32	.37	
	20-34	10-30	35-75	15-35	1.60-1.90	0.00-0.42	0.02-0.08	5.0-14	5.0-15	3.6-5.0	0.1-2.9	0.1-0.5	.28	.37	
	34-80	5-15	5-55	40-80	1.20-1.40	0.42-1.40	0.05-0.10	12-22	12-24	3.6-5.0	3.0-5.9	0.1-0.5	.32	.32	
71250, 71251: Britwater-----	0-6	10-35	45-82	8-20	1.35-1.45	4.00-14.00	0.14-0.20	5.0-15	2.0-15	5.5-7.8	0.1-2.9	1.0-2.0	.37	.43	5
	6-22	10-40	25-72	18-35	1.35-1.45	4.00-14.00	0.12-0.18	5.0-15	3.0-12	5.5-7.8	0.1-2.9	0.5-1.0	.28	.37	
	22-80	10-30	20-63	27-50	1.30-1.45	4.00-14.00	0.06-0.14	5.0-25	3.0-15	5.5-7.8	0.1-2.9	0.1-0.5	.28	.37	
73000: Pomme-----	0-7	10-35	45-80	10-20	1.35-1.45	4.00-14.00	0.16-0.21	5.0-12	2.0-15	5.6-7.3	0.1-2.9	1.0-2.0	.32	.37	5
	7-19	5-35	35-77	18-30	1.30-1.45	4.00-14.00	0.14-0.21	8.0-16	3.0-15	5.6-7.3	0.1-2.9	0.2-1.0	.32	.43	
	19-57	5-35	25-67	28-40	1.30-1.45	4.00-14.00	0.08-0.14	8.0-16	3.0-15	5.1-7.3	0.1-2.9	0.1-1.0	.28	.43	
	57-86	5-15	10-50	45-75	1.25-1.40	4.00-14.00	0.04-0.14	10-30	5.0-20	4.5-7.3	3.0-5.9	0.1-1.0	.20	.28	

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Cation exchange capacity	Effective cation exchange capacity	Soil reaction	Shrink- swell potential	Organic matter	Erosion factors			Wind erodi- bility group
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	meq/100g	meq/100g	pH	Pct	Pct				
73007: Plato-----	0-6	5-15	65-87	8-20	1.20-1.50	4.00-14.00	0.20-0.22	12-28	5.0-20	4.5-7.3	0.1-2.9	1.0-4.0	.43	.43	4	5
	6-29	3-10	35-70	27-55	1.30-1.50	1.40-4.00	0.10-0.18	10-30	8.0-30	3.5-5.5	6.0-8.9	0.2-1.0	.32	.37		
	29-46	5-30	40-85	10-30	1.60-1.90	0.00-0.42	0.01-0.05	5.0-20	5.0-20	3.5-5.5	3.0-5.9	0.1-0.5	.24	.43		
	46-80	5-30	10-67	27-60	1.40-1.60	0.42-1.40	0.02-0.06	8.0-20	6.0-17	4.5-6.0	6.0-8.9	0.1-0.5	.24	.32		
73010: Wilderness-----	0-6	10-25	60-85	5-15	1.20-1.45	14.00-42.00	0.07-0.12	5.0-20	2.0-15	4.5-6.5	0.1-2.9	1.0-4.0	.28	.37	3	8
	6-17	7-35	35-78	15-30	1.30-1.50	4.00-14.00	0.03-0.10	10-22	5.0-15	4.5-6.0	0.1-2.9	0.5-1.0	.28	.43		
	17-38	12-50	15-78	10-35	1.70-2.00	0.01-0.42	0.01-0.05	6.0-15	2.0-10	3.5-5.5	0.1-2.9	0.1-0.5	.28	.43		
	38-80	5-30	10-60	40-80	1.40-1.60	4.00-14.00	0.07-0.12	10-25	6.0-25	4.5-6.0	3.0-5.9	0.1-0.5	.20	.24		
73013: Lowassie-----	0-10	1-10	63-89	10-27	1.30-1.50	4.00-14.00	0.22-0.24	5.0-12	4.0-10	5.1-7.3	0.1-2.9	1.0-2.0	.37	.37	5	5
	10-18	1-10	55-84	15-35	1.30-1.50	4.00-14.00	0.20-0.22	5.0-15	5.0-15	4.5-6.0	0.1-2.9	0.2-2.0	.43	.43		
	18-36	1-10	25-59	40-65	1.35-1.60	0.42-1.40	0.09-0.15	12-35	5.0-25	3.5-5.5	6.0-8.9	0.2-1.0	.32	.43		
	36-80	1-20	45-91	8-35	1.40-1.65	1.40-4.00	0.18-0.22	8.0-31	6.0-32	3.5-5.5	6.0-8.9	0.1-0.5	.43	.43		
73014: Clarksville-----	0-3	15-32	56-80	5-12	1.20-1.40	14.00-42.00	0.07-0.16	10-26	3.0-18	3.5-7.3	0.1-2.9	2.0-8.0	.28	.37	3	8
	3-13	10-35	47-85	5-18	1.30-1.45	14.00-42.00	0.06-0.10	5.0-10	2.0-5.0	3.5-6.5	0.1-2.9	0.1-1.0	.32	.43		
	13-47	10-40	25-80	10-35	1.20-1.40	14.00-42.00	0.05-0.08	5.0-14	3.0-10	3.5-5.5	0.1-2.9	0.1-0.5	.20	.28		
	47-80	10-25	10-50	40-65	1.20-1.40	1.40-4.00	0.04-0.08	10-20	8.0-20	3.5-5.5	3.0-5.9	0.1-0.5	.20	.32		
73015, 73016: Viraton-----	0-6	8-22	53-84	8-25	1.30-1.50	4.00-14.00	0.18-0.22	6.0-14	3.0-10	4.5-7.3	0.1-2.9	0.5-2.0	.43	.43	4	6
	6-21	5-20	45-77	18-35	1.30-1.50	4.00-14.00	0.08-0.16	8.0-15	6.0-18	4.5-6.0	0.1-2.9	0.5-1.0	.43	.43		
	21-33	12-37	28-74	14-35	1.60-1.90	0.00-0.42	0.01-0.05	8.0-15	6.0-16	4.5-5.5	0.1-2.9	0.1-0.5	.32	.43		
	33-60	4-45	10-61	35-80	1.10-1.40	1.40-4.00	0.06-0.10	15-30	10-20	4.5-7.3	3.0-5.9	0.1-0.5	.24	.28		
73017: Bendavis-----	0-3	14-35	50-81	5-15	1.30-1.50	4.00-14.00	0.09-0.12	4.0-13	2.0-6.0	3.5-6.0	0.1-2.9	2.0-6.0	.15	.37	2	5
	3-14	15-35	47-77	8-18	1.30-1.50	4.00-14.00	0.13-0.17	4.0-15	2.0-7.0	4.5-6.0	0.1-2.9	0.5-1.5	.24	.37		
	14-34	12-30	43-78	10-30	1.30-1.50	4.00-14.00	0.13-0.17	8.0-28	1.0-9.0	4.5-6.0	0.1-2.9	0.1-0.8	.17	.37		
	34-80	---	---	---	---	0.00-0.00	---	---	---	---	---	---	---	---		
Poynor-----	0-4	10-25	55-84	6-20	1.20-1.45	4.00-14.00	0.04-0.12	5.0-12	2.0-8.0	3.5-6.5	0.1-2.9	2.0-8.0	.28	.37	3	8
	4-10	15-25	60-77	8-15	1.25-1.45	4.00-14.00	0.02-0.09	2.0-8.0	2.0-8.0	3.5-6.0	0.1-2.9	0.5-2.0	.28	.43		
	10-28	10-20	45-75	15-35	1.40-1.55	4.00-14.00	0.02-0.09	3.0-10	3.0-12	3.5-6.0	0.1-2.9	0.1-0.8	.28	.43		
	28-80	1-15	5-59	45-80	1.50-1.65	1.40-4.00	0.08-0.12	15-25	12-25	3.5-5.0	3.0-5.9	0.1-0.5	.28	.28		
73018: Clarksville-----	0-3	15-30	55-80	5-15	1.20-1.40	4.00-14.00	0.07-0.16	8.0-15	4.0-10	3.5-7.3	0.1-2.9	2.0-8.0	.28	.37	3	8
	3-13	15-32	52-80	5-15	1.30-1.45	4.00-14.00	0.06-0.10	3.0-10	2.0-10	3.5-6.5	0.1-2.9	0.1-1.0	.32	.43		
	13-47	15-35	30-67	18-35	1.20-1.40	4.00-14.00	0.05-0.08	4.0-11	5.0-15	3.5-5.5	0.1-2.9	0.1-0.5	.20	.28		
	47-80	10-20	20-45	45-60	1.20-1.40	1.40-4.00	0.04-0.08	10-20	8.0-20	3.5-5.5	3.0-5.9	0.1-0.5	.20	.32		

Table 16.--Physical and Chemical Properties of the Soils--Continued

Wind erodi- bility index	Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Cation exchange capacity	Effective cation exchange capacity	Soil reaction	Shrink- swell potential	Organic matter	Erosion factors		
		In	Pct	Pct	Pct	g/cc	um/sec	In/in	meq/100g	meq/100g	pH	Pct	Pct	Kw	Kf	T
56	73019: Poynor-----	0-4	15-30	50-80	5-20	1.20-1.45	4.00-14.00	0.04-0.12	8.0-18	3.0-9.0	3.5-6.5	0.1-2.9	0.5-1.0	.28	.37	3
		4-10	5-25	60-90	5-15	1.25-1.45	4.00-14.00	0.02-0.09	4.0-10	3.0-10	3.5-6.0	0.1-2.9	0.5-1.0	.28	.43	
		10-28	5-15	50-80	15-35	1.40-1.55	4.00-14.00	0.02-0.09	5.0-15	3.0-12	3.5-6.0	0.1-2.9	0.1-0.5	.28	.43	
		28-80	2-20	5-53	45-75	1.50-1.65	1.40-4.00	0.08-0.12	15-25	10-20	3.5-5.0	3.0-5.9	0.1-0.5	.28	.28	
0	73020: Poynor-----	0-4	15-30	50-80	5-20	1.20-1.45	4.00-14.00	0.04-0.12	8.0-18	3.0-9.0	3.5-6.5	0.1-2.9	2.0-8.0	.28	.37	3
		4-10	5-25	60-90	5-15	1.25-1.45	4.00-14.00	0.02-0.09	4.0-10	3.0-10	3.5-6.0	0.1-2.9	0.5-2.0	.28	.43	
		10-28	5-15	50-80	15-35	1.40-1.55	4.00-14.00	0.02-0.09	5.0-15	3.0-12	3.5-6.0	0.1-2.9	0.1-0.8	.28	.43	
		28-80	2-20	5-53	45-75	1.50-1.65	1.40-4.00	0.08-0.12	15-25	10-20	3.5-5.0	3.0-5.9	0.1-0.5	.28	.28	
56	73021: Poynor-----	0-4	10-25	55-84	6-20	1.20-1.45	4.00-14.00	0.04-0.12	5.0-12	2.0-8.0	3.5-6.5	0.1-2.9	2.0-8.0	.28	.37	3
		4-10	15-25	40-77	8-15	1.25-1.45	4.00-14.00	0.02-0.09	2.0-8.0	2.0-8.0	3.5-6.0	0.1-2.9	0.5-2.0	.28	.43	
		10-28	10-20	45-75	15-35	1.40-1.55	4.00-14.00	0.02-0.09	3.0-10	3.0-12	3.5-6.0	0.1-2.9	0.1-0.8	.28	.43	
		28-80	1-15	5-59	40-80	1.50-1.65	1.40-4.00	0.08-0.12	15-25	12-25	3.5-5.0	3.0-5.9	0.1-0.5	.28	.28	
0	73022: Alred-----	0-4	15-30	55-80	5-15	1.30-1.50	4.00-14.00	0.09-0.13	5.0-15	3.0-9.0	4.5-7.3	0.1-2.9	1.0-4.0	.17	.32	4
		4-27	5-25	40-80	15-35	1.30-1.50	4.00-14.00	0.06-0.10	8.0-18	6.0-15	4.5-7.3	0.1-2.9	0.2-1.0	.20	.28	
		27-80	4-20	10-56	40-80	1.40-1.60	0.42-1.40	0.08-0.12	25-45	25-35	4.5-7.3	6.0-8.9	0.2-0.8	.24	.28	
48	Bardley-----	0-4	20-35	45-72	8-20	1.40-1.55	4.00-14.00	0.12-0.17	8.0-15	4.0-10	4.5-6.5	0.1-2.9	0.5-2.0	.28	.37	2
		4-8	20-35	47-71	9-18	1.40-1.55	4.00-14.00	0.04-0.08	4.0-10	2.0-8.0	4.5-6.5	0.1-2.9	0.5-1.0	.32	.43	
		8-27	5-12	3-55	40-85	1.20-1.40	0.42-1.40	0.08-0.12	20-50	18-35	4.5-7.3	6.0-8.9	0.1-0.5	.28	.28	
		27-80	---	---	---	---	0.00-0.00	---	---	---	---	---	---	---	---	
56	73023: Mano-----	0-3	20-30	52-75	5-18	1.20-1.40	4.00-14.00	0.13-0.18	5.0-15	4.0-9.0	4.5-7.3	0.1-2.9	2.0-8.0	.28	.43	4
		3-13	20-30	55-75	5-15	1.20-1.40	4.00-14.00	0.13-0.18	4.0-13	2.0-8.0	4.5-7.3	0.1-2.9	0.5-2.0	.28	.43	
		13-33	8-20	50-80	12-30	1.30-1.40	4.00-14.00	0.04-0.14	5.0-12	3.0-10	4.5-6.5	0.1-2.9	0.2-1.0	.32	.43	
		33-80	1-20	5-44	55-75	1.30-1.60	0.42-1.40	0.06-0.12	18-30	15-30	4.5-7.3	6.0-8.9	0.1-0.8	.28	.28	
0	Ocie-----	0-5	10-35	45-85	5-20	1.10-1.40	4.00-14.00	0.12-0.17	10-18	4.0-12	4.5-6.5	0.1-2.9	2.0-12	.32	.37	3
		5-11	10-35	45-85	5-20	1.10-1.35	4.00-14.00	0.12-0.15	4.0-10	1.0-6.0	4.5-6.0	0.1-2.9	0.5-2.0	.32	.43	
		11-24	5-25	40-75	20-35	1.10-1.35	4.00-14.00	0.12-0.15	6.0-12	3.0-10	4.5-6.0	0.1-2.9	0.1-1.0	.32	.43	
		24-56	2-10	4-33	65-86	1.10-1.30	0.42-1.40	0.07-0.10	28-42	20-40	5.1-7.3	6.0-8.9	0.1-1.0	.32	.32	
0	73024: Mano-----	0-3	20-30	52-75	5-18	1.20-1.40	4.00-14.00	0.13-0.18	5.0-15	4.0-9.0	4.5-7.3	0.1-2.9	2.0-8.0	.28	.43	4
		3-13	20-30	55-75	5-15	1.20-1.40	4.00-14.00	0.13-0.18	4.0-13	2.0-8.0	4.5-7.3	0.1-2.9	0.5-1.0	.28	.43	
		13-33	8-20	50-80	12-30	1.30-1.40	4.00-14.00	0.04-0.14	5.0-12	3.0-10	4.5-6.5	0.1-2.9	0.2-1.0	.32	.43	
		33-80	1-20	5-44	55-75	1.30-1.60	0.42-1.40	0.06-0.12	18-30	15-30	4.5-7.3	6.0-8.9	0.1-0.8	.28	.28	

Map symbol and soil name													Erosion factors			Wind
	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Cation exchange capacity	Cation exchange capacity	Soil reaction	Shrink- swell potential	Organic matter	Kw	Kf	T	erodi- bilit- group
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	meq/100g	meq/100g	pH	Pct	Pct				
73024: Ocie-----	0-5	10-35	45-85	5-20	1.10-1.40	4.00-14.00	0.12-0.17	10-18	4.0-12	4.5-6.5	0.1-2.9	2.0-12	.32	.37	3	8
	5-11	10-35	45-85	5-20	1.10-1.35	4.00-14.00	0.12-0.15	4.0-10	1.0-6.0	4.5-6.0	0.1-2.9	0.5-2.0	.32	.43		
	11-24	5-25	40-75	20-35	1.10-1.35	4.00-14.00	0.12-0.15	6.0-12	3.0-10	4.5-6.0	0.1-2.9	0.1-1.0	.32	.43		
	24-56	2-10	4-33	65-86	1.10-1.30	0.42-1.40	0.07-0.10	28-42	20-40	5.1-7.3	6.0-8.9	0.1-1.0	.32	.32		
	56-80	---	---	---	---	0.00-0.00	---	---	---	---	---	---	---	---		
73025: Gatewood-----	0-2	15-30	50-75	10-20	1.10-1.40	4.00-14.00	0.12-0.17	8.0-18	4.0-15	5.1-7.3	0.1-2.9	2.0-8.0	.32	.37	2	8
	2-5	15-30	50-78	7-20	1.10-1.40	4.00-14.00	0.12-0.17	3.0-10	4.0-12	5.1-7.3	0.1-2.9	0.5-2.0	.32	.37		
	5-36	2-20	5-38	60-85	1.10-1.30	0.42-1.40	0.09-0.12	20-38	15-35	4.5-7.3	6.0-8.9	0.5-1.0	.24	.32		
	36-80	---	---	---	---	---	---	---	---	---	---	---	---	---		
Ocie-----	0-5	10-35	45-85	5-20	1.10-1.40	4.00-14.00	0.12-0.17	10-18	4.0-12	4.5-6.5	0.1-2.9	2.0-12	.32	.37	3	8
	5-11	10-35	45-85	5-20	1.10-1.35	4.00-14.00	0.12-0.15	4.0-10	1.0-6.0	4.5-6.0	0.1-2.9	0.5-2.0	.32	.43		
	11-24	5-25	40-75	20-35	1.10-1.35	4.00-14.00	0.12-0.15	6.0-12	3.0-10	4.5-6.0	0.1-2.9	0.1-1.0	.32	.43		
	24-56	2-10	4-33	65-86	1.10-1.30	0.42-1.40	0.07-0.10	28-42	20-40	5.1-7.3	6.0-8.9	0.1-1.0	.32	.32		
	56-80	---	---	---	---	---	---	---	---	---	---	---	---	---		
73026: Gatewood-----	0-2	15-30	50-75	10-20	1.10-1.30	4.00-14.00	0.12-0.17	8.0-18	4.0-15	4.5-6.5	0.1-2.9	2.0-12	.15	.32	3	8
	2-5	15-30	50-78	7-20	1.10-1.35	4.00-14.00	0.12-0.15	3.0-10	4.0-12	4.5-6.5	0.1-2.9	0.5-4.0	.10	.32		
	5-36	2-20	5-35	60-85	1.10-1.35	0.42-1.40	0.07-0.10	20-38	15-35	5.1-7.3	3.0-5.9	0.1-1.0	.05	.15		
	36-80	---	---	---	---	---	---	---	---	---	---	---	---	---		
Ocie-----	0-5	15-30	52-80	5-18	1.10-1.40	4.00-14.00	0.12-0.17	5.0-20	3.0-12	5.1-7.3	0.1-2.9	2.0-8.0	.32	.37	2	8
	5-11	12-30	55-83	5-15	1.10-1.40	4.00-14.00	0.12-0.17	4.0-12	1.0-6.0	5.1-7.3	0.1-2.9	0.5-2.0	.32	.37		
	11-24	5-30	35-80	15-35	1.10-1.35	4.00-14.00	0.12-0.15	5.0-12	3.0-10	4.5-6.0	0.1-2.9	0.1-1.0	.32	.43		
	24-56	2-14	16-43	55-70	1.10-1.30	0.42-1.40	0.09-0.12	20-30	15-30	4.5-7.3	6.0-8.9	0.1-0.5	.24	.32		
	56-80	---	---	---	---	---	---	---	---	---	---	---	---	---		
73027: Gatewood-----	0-2	15-30	50-75	10-20	1.10-1.40	4.00-14.00	0.06-0.12	8.0-18	4.0-15	5.1-7.3	0.1-2.9	2.0-8.0	.28	.37	2	8

Table 16.--Physical and Chemical Properties of the Soils--Continued

Wind erodi- bility index	Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Cation exchange capacity	Effective cation exchange capacity	Soil reaction	Shrink- swell potential	Organic matter	Erosion factors		
		In	Pct	Pct	Pct	g/cc	um/sec	In/in	meq/100g	meq/100g	pH	Pct	Pct	Kw	Kf	T
0	73028: Rueter-----	0-5	10-30	55-85	5-15	1.20-1.40	4.00-14.00	0.07-0.16	5.0-15	3.0-10	3.5-7.3	0.1-2.9	2.0-8.0	.28	.37	3
		5-13	10-30	55-86	4-15	1.30-1.45	4.00-14.00	0.06-0.10	3.0-9.0	2.0-6.0	3.5-6.5	0.1-2.9	0.1-1.0	.32	.43	
		13-42	10-40	32-80	10-27	1.20-1.40	4.00-14.00	0.05-0.08	5.0-15	5.0-16	3.5-5.5	1.0-2.9	0.1-0.5	.20	.28	
		42-80	1-20	5-59	40-80	1.20-1.40	1.40-4.00	0.04-0.08	12-30	8.0-20	3.5-5.5	3.0-5.9	0.1-0.5	.20	.32	
0	Bardley-----	0-4	20-35	45-72	8-20	1.40-1.55	4.00-14.00	0.12-0.17	8.0-15	4.0-10	4.5-6.5	0.1-2.9	0.5-2.0	.28	.37	3
		4-8	20-35	47-71	9-18	1.40-1.55	4.00-14.00	0.04-0.08	4.0-10	2.0-8.0	4.5-6.5	0.1-2.9	0.5-1.0	.32	.43	
		8-27	5-12	3-55	40-85	1.20-1.40	0.42-1.40	0.08-0.12	20-50	18-35	4.5-7.3	3.0-5.9	0.1-0.5	.28	.28	
		27-80	---	---	---	---	---	---	---	---	---	---	---	---	---	
0	73029: Gasconade-----	0-7	12-30	30-61	27-40	1.35-1.50	0.42-1.40	0.08-0.12	25-40	25-45	6.1-7.8	3.0-5.9	2.0-4.0	.24	.32	1
		7-14	15-35	10-45	40-55	1.35-1.50	1.40-4.00	0.07-0.11	20-35	25-40	6.1-7.8	3.0-5.9	1.0-2.0	.24	.32	
		14-80	---	---	---	---	---	---	---	---	---	---	---	---	---	
	Gatewood-----	0-2	15-30	50-75	10-20	1.10-1.40	4.00-14.00	0.12-0.17	8.0-18	4.0-15	5.1-7.3	0.1-2.9	2.0-8.0	.32	.37	2
0		2-5	15-30	50-78	7-20	1.10-1.40	4.00-14.00	0.12-0.17	3.0-10	4.0-12	5.1-7.3	0.1-2.9	0.5-2.0	.32	.37	
		5-36	2-20	5-35	60-85	1.10-1.30	0.42-1.40	0.09-0.12	20-38	15-35	4.5-7.3	6.0-8.9	0.5-1.0	.24	.32	
		36-80	---	---	---	---	---	---	---	---	---	---	---	---	---	
	Rock outcrop----	0-60	---	---	---	---	---	---	---	---	---	---	---	---	---	
0	73030: Gasconade-----	0-7	12-35	30-61	27-40	1.35-1.50	4.00-14.00	0.05-0.07	25-40	25-45	6.1-7.8	3.0-5.9	2.0-4.0	.20	.32	1
		7-14	15-35	10-45	40-55	1.45-1.70	1.40-4.00	0.05-0.07	20-35	25-40	6.1-7.8	3.0-5.9	0.5-1.0	.20	.28	
		14-80	---	---	---	---	---	---	---	---	---	---	---	---	---	
	73032: Gatewood-----	0-2	15-30	50-75	10-20	1.10-1.40	4.00-14.00	0.12-0.17	8.0-18	4.0-15	5.1-7.3	0.1-2.9	2.0-8.0	.32	.37	2
0		2-5	15-30	50-78	7-20	1.10-1.40	4.00-14.00	0.12-0.17	3.0-10	4.0-12	5.1-7.3	0.1-2.9	0.5-2.0	.32	.37	
		5-36	2-20	5-35	60-85	1.10-1.30	0.42-1.40	0.09-0.12	20-38	15-35	4.5-7.3	6.0-8.9	0.5-1.0	.24	.32	
		36-80	---	---	---	---	---	---	---	---	---	---	---	---	---	
0	73033: Gatewood-----	0-2	15-30	50-75	10-20	1.10-1.40	4.00-14.00	0.12-0.17	8.0-18	4.0-15	5.1-7.3	0.1-2.9	2.0-8.0	.32	.37	2
		2-5	15-30	50-78	7-20	1.10-1.40	4.00-14.00	0.12-0.17	3.0-10	4.0-12	5.1-7.3	0.1-2.9	0.5-2.0	.32	.37	
		5-36	2-20	5-35	60-85	1.10-1.30	0.42-1.40	0.09-0.12	20-38	15-35	4.5-7.3	6.0-8.9	0.5-1.0	.24	.32	
		36-80	---	---	---	---	---	---	---	---	---	---	---	---	---	
0	73051: Winnipeg-----	0-6	5-20	60-87	8-20	1.20-1.40	4.00-14.00	0.20-0.22	7.0-14	5.0-15	5.1-7.0	0.1-2.9	0.5-2.0	.37	.37	5
		6-16	5-15	58-80	15-30	1.20-1.40	4.00-14.00	0.18-0.22	5.0-14	4.0-10	4.5-7.0	0.1-2.9	0.5-1.0	.43	.43	
		16-44	5-20	45-70	25-35	1.20-1.50	4.00-14.00	0.16-0.20	10-18	6.0-12	4.5-7.0	3.0-5.9	0.1-0.5	.43	.32	
		44-80	10-20	40-65	27-40	1.30-1.55	1.40-4.00	0.12-0.16	10-20	6.0-12	4.5-7.0	3.0-5.9	0.1-0.5	.20	.28	

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Cation exchange capacity	Effective cation exchange capacity	Soil reaction	Shrink- swell potential	Organic matter	Erosion factors			Wind erodi- bility group
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	meq/100g	meq/100g	pH	Pct	Pct				
74626: Tanglenook-----	0-6	5-12	61-80	15-27	1.25-1.30	4.00-14.00	0.21-0.25	15-27	8.0-20	6.1-7.3	0.1-2.9	2.0-4.0	.37	.37	5	6
	6-17	5-12	48-80	15-40	1.30-1.40	1.40-4.00	0.18-0.21	10-25	8.0-20	6.1-7.3	3.0-5.9	2.0-4.0	.37	.37		
	17-30	1-25	15-54	35-60	1.40-1.45	0.42-1.40	0.10-0.13	20-40	15-35	5.6-7.3	6.0-8.9	1.0-2.0	.32	.32		
	30-56	1-25	15-54	35-60	1.40-1.45	0.42-1.40	0.10-0.13	20-40	15-35	5.6-7.3	6.0-8.9	1.0-2.0	.32	.32		
	56-80	1-25	15-54	35-60	1.40-1.45	0.42-1.40	0.10-0.13	20-40	15-35	5.6-7.3	6.0-8.9	1.0-2.0	.32	.32		
74627: Hartville-----	0-7	8-15	60-82	10-25	1.10-1.30	4.00-14.00	0.22-0.24	8.0-16	4.0-10	4.5-7.3	0.1-2.9	1.0-3.0	.43	.43	5	6
	7-11	8-15	60-82	10-25	1.20-1.40	4.00-14.00	0.18-0.21	8.0-16	5.0-12	4.5-7.3	3.0-5.9	0.5-1.0	.43	.43		
	11-40	5-15	30-60	35-55	1.20-1.50	0.42-1.40	0.10-0.16	18-30	15-24	4.5-6.5	6.0-8.9	0.1-0.5	.32	.32		
	40-80	5-15	45-68	27-40	1.20-1.50	1.40-4.00	0.08-0.14	12-25	10-25	4.5-6.5	6.0-8.9	0.1-0.5	.32	.32		
75377: Racket-----	0-21	20-30	40-65	15-27	1.25-1.45	4.00-14.00	0.18-0.24	8.0-18	8.0-14	6.1-7.3	0.1-2.9	1.0-4.0	.32	.32	5	6
	21-42	15-40	30-70	15-27	1.25-1.45	4.00-14.00	0.16-0.20	10-19	8.0-16	6.1-7.3	3.0-5.9	1.0-3.0	.32	.32		
	42-80	55-85	5-40	5-10	1.35-1.55	42.00-141.00	0.02-0.08	5.0-12	3.0-10	6.1-7.3	0.1-2.9	0.5-2.0	.10	.17		
75379: Kaintuck-----	0-6	40-60	25-55	7-15	1.30-1.50	14.00-42.00	0.09-0.17	4.0-12	5.0-10	5.6-7.3	0.1-2.9	0.5-2.0	.24	.24	5	3
	6-45	40-65	20-55	5-15	1.20-1.50	14.00-42.00	0.14-0.19	5.0-12	4.0-10	5.6-7.3	0.1-2.9	0.5-1.0	.32	.32		
	45-80	50-80	8-46	4-12	1.20-1.50	42.00-141.00	0.06-0.20	2.0-8.0	2.0-8.0	5.6-7.3	0.1-2.9	0.1-0.5	.28	.28		
75380: Dapue-----	0-9	5-30	52-85	10-18	1.10-1.35	4.00-14.00	0.20-0.24	8.0-12	5.0-10	5.1-7.3	0.1-2.9	1.0-4.0	.28	.28	5	5
	9-15	5-30	43-83	12-27	1.10-1.35	4.00-14.00	0.18-0.24	8.0-13	5.0-10	5.6-7.3	0.1-2.9	1.0-4.0	.28	.28		
	15-80	3-20	50-82	15-30	1.30-1.50	4.00-14.00	0.16-0.22	7.0-15	5.0-12	5.6-7.3	0.1-2.9	0.5-1.0	.32	.32		
75381: Bearthicket-----	0-10	10-30	50-82	8-20	1.20-1.40	4.00-14.00	0.20-0.24	5.0-12	5.0-12	5.1-7.3	0.1-2.9	0.5-3.0	.37	.37	5	5
	10-48	8-15	55-77	15-30	1.20-1.50	4.00-14.00	0.18-0.22	5.0-15	4.0-10	5.1-7.3	0.1-2.9	0.2-1.0	.28	.28		
	48-80	3-20	48-82	15-32	1.20-1.50	4.00-14.00	0.12-0.22	7.0-12	4.0-10	5.1-6.5	0.1-2.9	0.2-1.0	.28	.28		
75382: Cedargap-----	0-8	30-55	25-60	10-20	1.20-1.45	4.00-14.00	0.11-0.18	8.0-22	3.0-20	5.6-7.8	0.1-2.9	2.0-8.0	.24	.32	5	8
	8-46	30-55	12-55	15-32	1.30-1.50	4.00-14.00	0.10-0.15	8.0-16	5.0-15	5.6-7.8	0.1-2.9	2.0-6.0	.24	.32		
	46-80	30-55	10-52	18-35	1.40-1.55	4.00-14.00	0.04-0.12	8.0-20	7.0-20	5.6-7.8	0.1-2.9	0.5-3.0	.10	.43		
75383: Cedargap-----	0-8	15-25	48-70	15-27	1.20-1.45	4.00-14.00	0.11-0.18	8.0-20	6.0-15	5.6-7.8	0.1-2.9	2.0-8.0	.24	.32	5	8
	8-46	25-45	25-57	18-30	1.30-1.50	4.00-14.00	0.10-0.15	10-20	5.0-15	5.6-7.8	0.1-2.9	2.0-6.0	.24	.32		
	46-80	25-45	20-57	18-35	1.40-1.55	4.00-14.00	0.04-0.12	12-20	8.0-18	5.6-7.8	0.1-2.9	0.5-3.0	.10	.43		

[illegible]

Table 17.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness		Uncoated steel	Concrete
		In	In			
66000: Moniteau-----	---	---	---	---	High	High
70006: Credon-----	Fragipan	19-32	6-30	Noncemented	Moderate	High
70020: Blueye-----	Bedrock (lithic)	20-40	---	Indurated	Moderate	High
70021: Moko-----	Bedrock (lithic)	6-20	---	Indurated	Moderate	Low
70022: Tonti-----	Fragipan	16-28	10-25	Noncemented	Moderate	High
71250, 71251: Britwater-----	---	---	---	---	Moderate	Moderate
73000: Pomme-----	---	---	---	---	Moderate	Moderate
73007: Plato-----	Fragipan	24-36	8-30	Noncemented	High	High
73010: Wilderness-----	Fragipan	15-30	6-28	Noncemented	Moderate	Moderate
73013: Lowassie-----	---	---	---	---	High	High
73014: Clarksville-----	---	---	---	---	Moderate	Low
73015, 73016: Viraton-----	Fragipan	20-30	10-30	Noncemented	Moderate	Moderate
73017: Bendavis-----	Bedrock (lithic)	20-40	---	Indurated	Moderate	Moderate
Poynor-----	---	---	---	---	Moderate	Moderate
73018: Clarksville-----	---	---	---	---	Moderate	Low
73019, 73020, 73021: Poynor-----	---	---	---	---	Moderate	Moderate
73022: Alred-----	---	---	---	---	Moderate	Moderate
Bardley-----	Bedrock (lithic)	20-40	---	Indurated	Moderate	Moderate
73023, 73024: Mano-----	---	---	---	---	Moderate	Moderate
Ocie-----	Bedrock (lithic)	40-60	---	Indurated	Moderate	High

Table 17.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential	Risk of corrosion	
	Kind	Depth	Thickness	Hardness	for frost action	Uncoated steel	Concrete
		to top					
		<u>In</u>	<u>In</u>				
73025, 73026, 73027: Gatewood-----	Bedrock (lithic)	20-40	---	Indurated	Moderate	High	Moderate
Ocie-----	Bedrock (lithic)	40-60	---	Indurated	Moderate	High	Moderate
73028: Rueter-----	---	---	---	---	Moderate	Low	High
Bardley-----	Bedrock (lithic)	20-40	---	Indurated	Moderate	---	---
73029: Gasconade-----	Bedrock (lithic)	12-20	---	Indurated	Moderate	High	Low
Gatewood-----	Bedrock (lithic)	20-40	---	Indurated	Moderate	High	Moderate
Rock outcrop.							
73030: Gasconade-----	Bedrock (lithic)	12-20	---	Indurated	Moderate	High	Low
73032, 73033: Gatewood-----	Bedrock (lithic)	20-40	---	Indurated	Moderate	High	Moderate
73051: Winnipeg-----	---	---	---	---	Moderate	Moderate	Moderate
74626: Tanglenook-----	---	---	---	---	High	High	Moderate
74627: Hartville-----	---	---	---	---	High	Moderate	Moderate
75377: Racket-----	---	---	---	---	Moderate	Moderate	Low
75379: Kaintuck-----	---	---	---	---	Moderate	High	Moderate
75380: Dapue-----	---	---	---	---	Moderate	Low	Moderate
75381: Bearthicket-----	---	---	---	---	Moderate	Moderate	Moderate
75382, 75383: Cedargap-----	---	---	---	---	Moderate	Low	Low
99000. Pits, quarries							
99001. Water							
99002. Orthents, borrow area, clayey							

Table 18.--Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydro- logic group	Months	Water table		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
66000: Moniteau-----	A	Jan-Apr May-Oct Nov-Dec	0.0-1.0 --- 0.0-1.0	>6.0 --- >6.0	--- --- ---	--- --- ---	--- --- ---	Very brief Very brief Very brief	Occasional Rare Occasional
70006: Credon-----	C	Jan-Apr May-Nov Dec	1.5-3.0 --- 1.5-3.0	5.9-5.9 --- 5.9-5.9	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---
70020: Blueye-----	C	All months	---	---	---	---	---	---	---
70021: Moko-----	D	All months	---	---	---	---	---	---	---
70022: Tonti-----	C	Jan-Mar Apr-Nov Dec	1.5-2.5 --- 1.5-2.5	2.0-3.0 --- 2.0-3.0	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---
71250: Britwater-----	B	Jan-Apr May-Oct Nov-Dec	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	Very brief Very brief Very brief	Rare Very rare Rare
71251: Britwater-----	B	All months	---	---	---	---	---	Very brief	Very rare
73000: Pomme-----	B	All months	---	---	---	---	---	---	---
73007: Plato-----	C	Jan-Apr May-Nov Dec	1.0-2.0 --- 1.0-2.0	2.0-3.0 --- 2.0-3.0	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---
73010: Wilderness-----	C	Jan-Mar Apr-Nov Dec	1.5-2.5 --- 1.5-2.5	2.0-3.0 --- 2.0-3.0	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Months	Water table		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
73013: Lowassie-----	D	Jan-Apr	0.0	4.0-6.0	0.0-0.5	Brief	Frequent	---	---
		May	---	---	0.0-0.5	Brief	Occasional	---	---
		Jun-Aug	---	---	0.0-0.5	Very brief	Rare	---	---
		Sep-Oct	---	---	0.0-0.5	Brief	Occasional	---	---
		Nov-Dec	0.0	4.0-6.0	0.0-0.5	Brief	Frequent	---	---
73014: Clarksville-----	B	All months	---	---	---	---	---	---	---
73015, 73016: Viraton-----	C	Jan-Mar	1.2-2.5	1.7-3.0	---	---	---	---	---
		Apr-Nov	---	---	---	---	---	---	---
		Dec	1.2-2.5	1.7-3.0	---	---	---	---	---
73017: Bendavis-----	C	All months	---	---	---	---	---	---	---
Poynor-----	B	All months	---	---	---	---	---	---	---
73018: Clarksville-----	B	All months	---	---	---	---	---	---	---
73019, 73020, 73021: Poynor-----	B	All months	---	---	---	---	---	---	---
73022: Alred-----	B	All months	---	---	---	---	---	---	---
Bardley-----	B	All months	---	---	---	---	---	---	---
73023, 73024: Mano-----	C	Jan-Mar	2.0-3.0	5.0-6.7	---	---	---	---	---
		Apr-Nov	---	---	---	---	---	---	---
		December	2.0-3.0	5.0-6.7	---	---	---	---	---
Ocie-----	C	Jan-Mar	2.0-3.0	3.3-5.0	---	---	---	---	---
		Apr-Nov	---	---	---	---	---	---	---
		Dec	2.0-3.0	3.3-5.0	---	---	---	---	---
73025: Gatewood-----	C	Jan-Mar	1.5-3.0	1.7-3.3	---	---	---	---	---
		Apr-Nov	---	---	---	---	---	---	---
		Dec	1.5-3.0	1.7-3.3	---	---	---	---	---
Ocie-----	C	Jan-Mar	2.0-3.0	3.3-5.0	---	---	---	---	---
		Apr-Nov	---	---	---	---	---	---	---
		Dec	2.0-3.0	3.3-5.0	---	---	---	---	---

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Months	Water table		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
73026: Gatewood-----	C								
		Jan-Mar	1.5-3.0	1.7-3.3	---	---	---	---	---
		Apr-Nov	---	---	---	---	---	---	---
		Dec	1.2-4.8	3.3-5.0	---	---	---	---	---
Ocie-----	C								
		Jan-Mar	2.0-3.0	3.3-5.0	---	---	---	---	---
		Apr-Nov	---	---	---	---	---	---	---
		Dec	2.0-3.0	3.3-5.0	---	---	---	---	---
73027: Gatewood-----	C								
		Jan-Mar	1.5-3.0	1.7-3.3	---	---	---	---	---
		April	1.5-3.0	5.9-5.9	---	---	---	---	---
		May-Nov	---	---	---	---	---	---	---
		Dec	1.5-3.0	1.7-3.3	---	---	---	---	---
Ocie-----	C								
		Jan-Mar	2.0-3.0	3.3-5.0	---	---	---	---	---
		Apr-Nov	---	---	---	---	---	---	---
		Dec	2.0-3.0	3.3-5.0	---	---	---	---	---
73028: Rueter-----	B								
		All months	---	---	---	---	---	---	---
Bardley-----	---								
		All months	---	---	---	---	---	---	---
73029: Gasconade-----	D								
		All months	---	---	---	---	---	---	---
Gatewood-----	C								
		Jan-Apr	1.5-3.0	1.7-3.3	---	---	---	---	---
		May-Nov	---	---	---	---	---	---	---
		Dec	1.5-3.0	1.7-3.3	---	---	---	---	---
Rock outcrop-----	D								
		All months	---	---	---	---	---	---	---
73030: Gasconade-----	D								
		All months	---	---	---	---	---	---	---
73032, 73033: Gatewood-----	C								
		Jan-Mar	1.5-3.0	1.7-3.3	---	---	---	---	---
		Apr	1.5-3.0	5.9-5.9	---	---	---	---	---
		May-Nov	---	---	---	---	---	---	---
		Dec	1.5-3.0	1.7-3.3	---	---	---	---	---
73051: Winnipeg-----	B								
		All months	---	---	---	---	---	---	---

Map symbol and soil name	Hydro- logic group	Months	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
74626: Tanglenook-----	D								
		Jan-Apr	0.0-1.5	>6.0	---	---	---	Very brief	Rare
		May-Aug	---	---	---	---	---	Very brief	Very rare
		Sep-Oct	---	---	---	---	---	Very brief	Rare
		Nov-Dec	0.0-1.5	>6.0	---	---	---	Very brief	Rare
74627: Hartville-----	C								
		Jan-Mar	1.0-2.5	>6.0	---	---	---	Very brief	Rare
		Apr	---	---	---	---	---	Very brief	Rare
		May-Oct	---	---	---	---	---	Very brief	Very rare
		Nov-Dec	1.0-2.5	>6.0	---	---	---	Very brief	Rare
75377: Racket-----	B								
		Jan-Mar	4.0-6.0	>6.0	---	---	---	Very brief	Frequent
		Apr	---	---	---	---	---	Very brief	Frequent
		May	---	---	---	---	---	Very brief	Occasional
		Jun-Sep	---	---	---	---	---	Very brief	Rare
		Oct	---	---	---	---	---	Very brief	Occasional
		Nov	---	---	---	---	---	Very brief	Frequent
		Dec	4.0-6.0	>6.0	---	---	---	Very brief	Frequent
75379: Kaintuck-----	B								
		Jan-Apr	---	---	---	---	---	Very brief	Frequent
		May	---	---	---	---	---	Very brief	Occasional
		Jun-Sep	---	---	---	---	---	Very brief	Rare
		Oct	---	---	---	---	---	Very brief	Occasional
		Nov-Dec	---	---	---	---	---	Very brief	Frequent
75380: Dapue-----	B								
		Jan-Apr	---	---	---	---	---	Very brief	Occasional
		May-Oct	---	---	---	---	---	Very brief	Rare
		Nov-Dec	---	---	---	---	---	Very brief	Occasional
75381: Bearthicket-----	B								
		Jan-Apr	---	---	---	---	---	Very brief	Rare
		May-Oct	---	---	---	---	---	Very brief	Very rare
		Nov-Dec	---	---	---	---	---	Very brief	Rare
75382, 75383: Cedargap-----	B								
		Jan-Mar	4.0-6.0	>6.0	---	---	---	Very brief	Frequent
		Apr	---	---	---	---	---	Very brief	Frequent
		May	---	---	---	---	---	Very brief	Occasional
		Jun-Sep	---	---	---	---	---	Very brief	Rare
		Oct	---	---	---	---	---	Very brief	Occasional
		Nov	---	---	---	---	---	Very brief	Frequent
		Dec	4.0-6.0	>6.0	---	---	---	Very brief	Frequent
99000. Pits, quarries									
99001. Water									
99002. Orthents, borrow area, clayey									

99002.
Orthents, borrow area,
clayey

Table 19.--Classification of the Soils

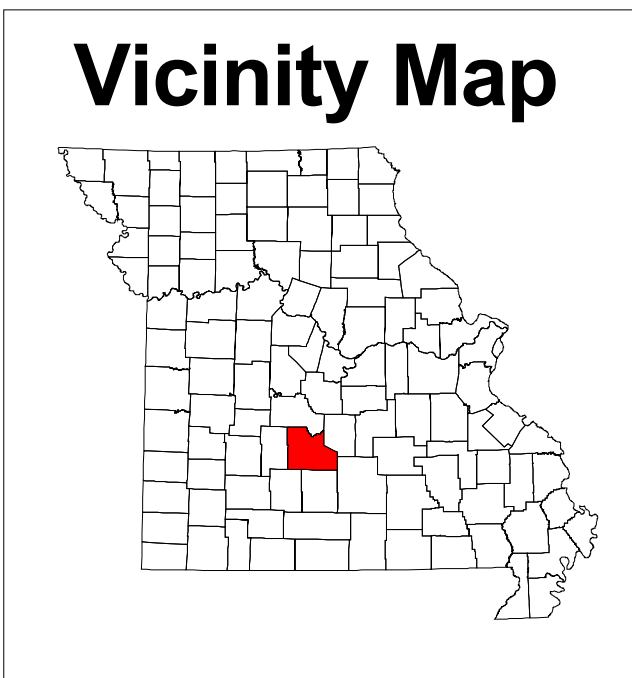
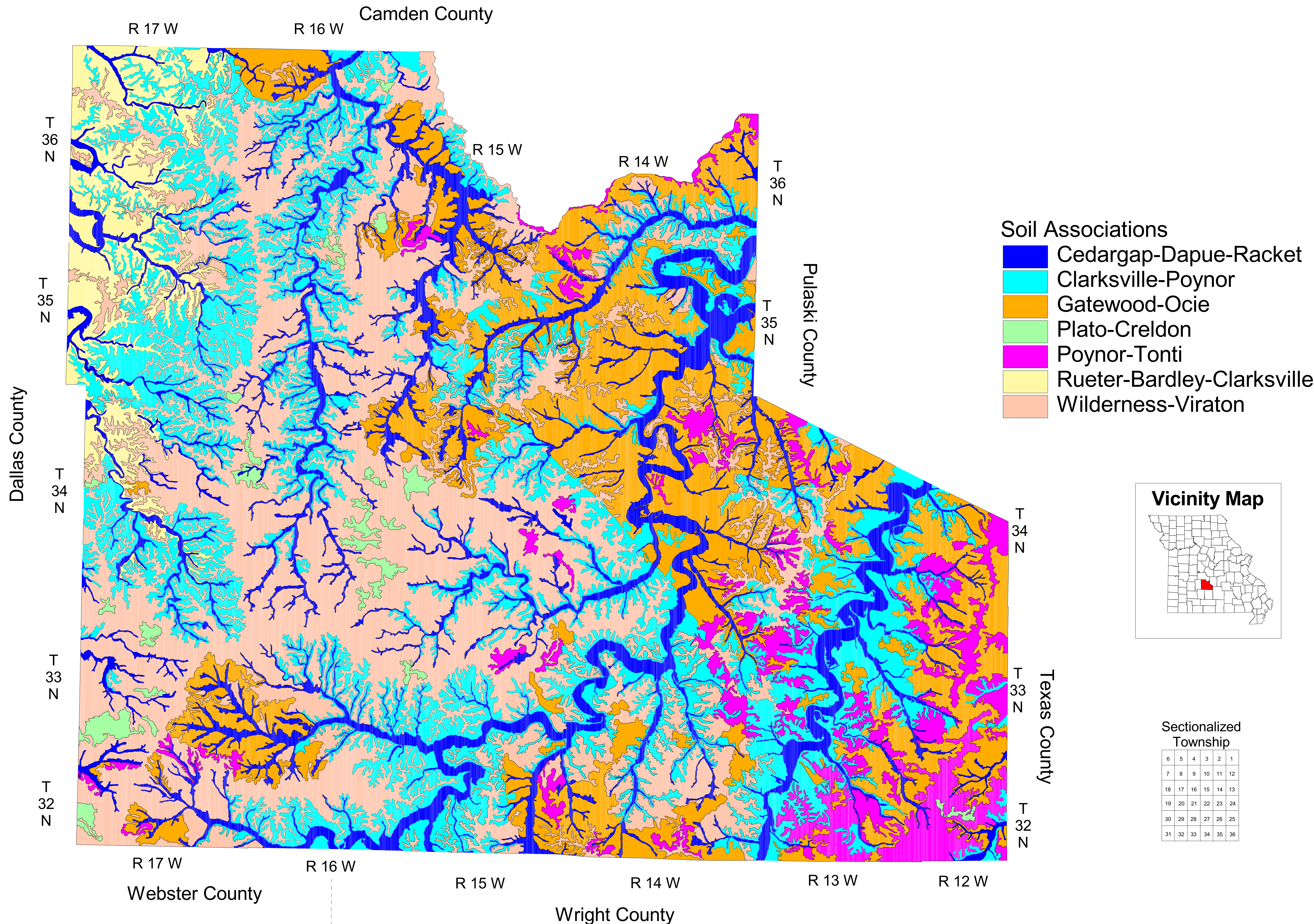
Soil name	Family or higher taxonomic class
Alred-----	Loamy-skeletal over clayey, siliceous, semiactive, mesic Typic Paleudalfs
Bardley-----	Very-fine, mixed, active, mesic Typic Hapludalfs
Bearthicket-----	Fine-silty, mixed, active, mesic Ultic Hapludalfs
Bendavis-----	Loamy-skeletal, siliceous, active, mesic Typic Hapludults
Blueye-----	Fine, mixed, active, mesic Typic Argiudolls
Britwater-----	Fine-loamy, mixed, active, mesic Typic Paleudalfs
Cedargap-----	Loamy-skeletal, mixed, superactive, mesic Cumulic Hapludolls
Clarksville-----	Loamy-skeletal, siliceous, active, mesic Typic Paleudults
Credon-----	Fine, mixed, active, mesic Oxyaquic Fragiudalfs
Dapue-----	Fine-silty, mixed, active, mesic Fluventic Hapludolls
Gasconade-----	Clayey-skeletal, mixed, superactive, mesic Lithic Hapludolls
Gatewood-----	Very-fine, mixed, active, mesic Oxyaquic Hapludalfs
Hartville-----	Fine, mixed, active, mesic Aquic Hapludalfs
Kaintuck-----	Coarse-loamy, siliceous, superactive, nonacid, mesic Typic Udifluvents
Lowassie-----	Fine, smectitic, mesic Vertic Epiaquults
Mano-----	Loamy-skeletal over clayey, mixed, semiactive, mesic Oxyaquic Hapludalfs
Moko-----	Loamy-skeletal, mixed, superactive, mesic Lithic Hapludolls
Moniteau-----	Fine-silty, mixed, superactive, mesic Typic Endoaqualfs
Ocie-----	Loamy-skeletal over clayey, mixed, semiactive, mesic Oxyaquic Hapludalfs
Plato-----	Fine, mixed, active, mesic Aquic Fragiudalfs
Pomme-----	Fine-loamy, mixed, semiactive, mesic Typic Paleudalfs
Poynor-----	Loamy-skeletal over clayey, siliceous, semiactive, mesic Typic Paleudults
Racket-----	Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls
Rueter-----	Loamy-skeletal, siliceous, active, mesic Typic Paleudalfs
Tanglenook-----	Fine, mixed, superactive, mesic Typic Argiaquolls
Tonti-----	Fine-loamy, mixed, active, mesic Typic Fragiudults
Viraton-----	Fine-loamy, siliceous, active, mesic Oxyaquic Fragiudalfs
Wilderness-----	Loamy-skeletal, siliceous, active, mesic Oxyaquic Fragiudalfs
Winnipeg-----	Fine-silty, mixed, active, mesic Typic Paleudalfs

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General Soil Map

Laclede County, Missouri



Sectionalized
Township

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

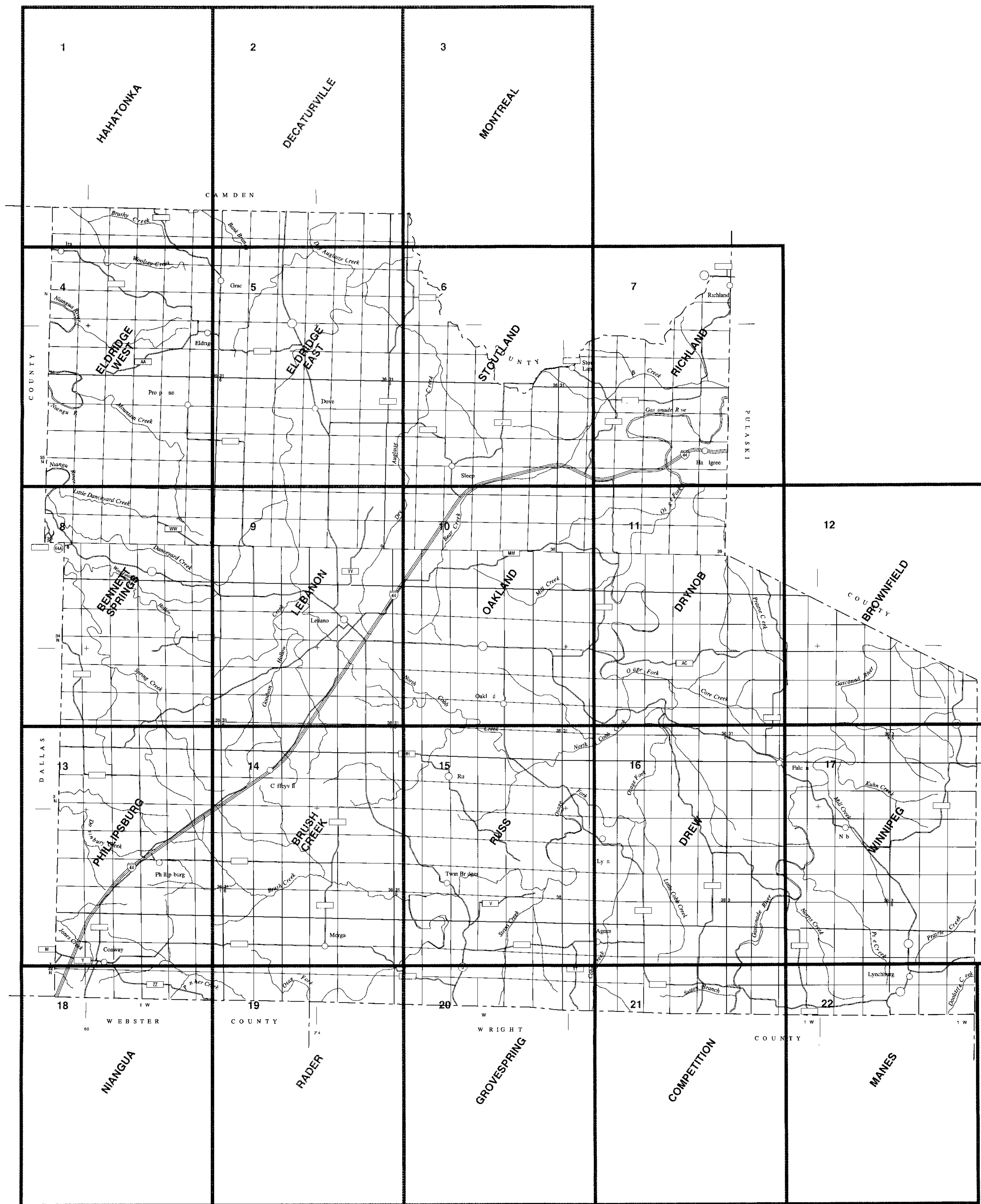
United States Department of Agriculture
Natural Resources Conservation Service
and
Missouri Department of Natural Resources
in cooperation with
Laclede County Soil and Water Conservation District
Missouri Agricultural Experiment Station



1:100,000



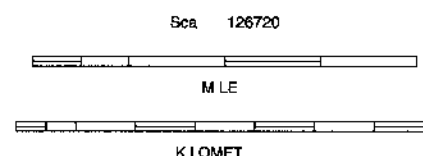
Contact: Fred Young
573-876-9427
fred.young@mo.usda.gov



SECTIONALIZED
TOWNSHIP

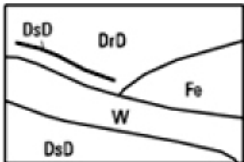
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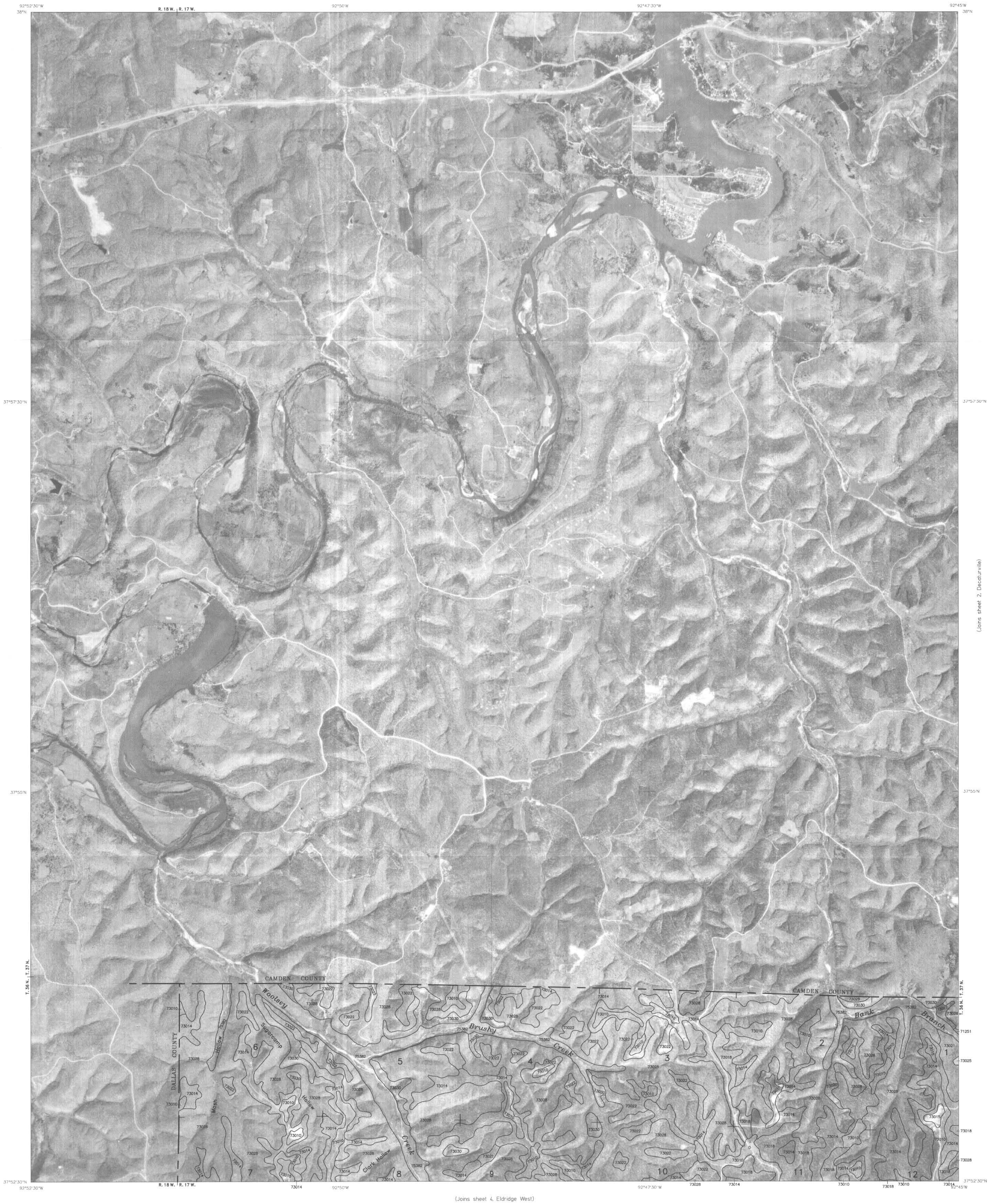
INDEX TO MAP SHEETS
LACLEDE COUNTY MISSOURI



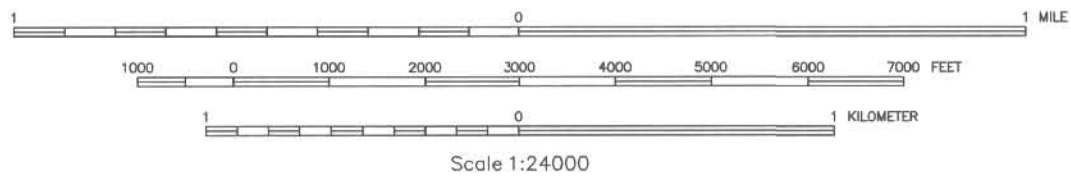
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FEATURE AND SYMBOL LEGEND FOR SOIL SURVEY

DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL
SOIL SURVEY FEATURES		CULTURAL FEATURES (Optional)		HYDROGRAPHIC FEATURES (Optional)	
SOIL DELINEATIONS AND LABELS		BOUNDARIES		Drainage end (indicates direction of flow)	
STANDARD LANDFORM AND MISCELLANEOUS SURFACE FEATURES		National, state or province		Perennial stream	
Bedrock escarpment		County or parish		Intermittent stream	
Non-bedrock escarpment		Minor civil division		Unclassified stream	
Gully		Reservation (national or state forest or park)		Perennial drainage or irrigation ditch	
Levee		Limit of soil survey (label) and/or denied access areas		Intermittent drainage or irrigation ditch	
Short steep slope		Field sheet matchline and neatline		Unclassified drainage or irrigation ditch	
Blowout		Public Land Survey System Section Boundary		Flood pool line	
Borrow pit		Public Land Survey System Section Corner Tics		Spring	
Clay spot				Well, artesian	
Closed depression				Well, irrigation	
Gravel pit					
Gravelly spot					
Landfill					
Lava flow					
Marsh or swamp					
Mine or quarry					
Miscellaneous water					
Perennial water					
Rock outcrop					
Saline spot					
Sandy spot					
Severely eroded spot					
Sinkhole					
Slide or slip					
Sodic spot					
Spoil area					
Stony spot					
Very stony spot					
Wet spot					
AD HOC FEATURES (Describe on back)		TRANSPORTATION			
LABEL	SYMBOL ID	SYMBOL	LABEL	SYMBOL ID	SYMBOL
_____	1		_____	23	
_____	2		_____	24	
_____	3		_____	25	
_____	4		_____	26	
_____	5		_____	27	
_____	6		_____	28	
_____	7		_____	29	
_____	8		_____	30	
_____	9		_____	31	
_____	10		_____	32	
_____	11		_____	33	
_____	12		_____	34	
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_____	17		_____	39	
_____	18		_____	40	
_____	19		_____	41	
_____	20		_____	42	
_____	21		_____	43	
_____	22		_____	44	
			ROAD EMBLEMS		
			Interstate		
			Federal		
			State		
			County, farm or ranch		
			LOCATED OBJECTS		
			Airport, airfield		
			Cemetery		
			Church		
			Farmstead, house (omit in urban areas)		
			Lighthouse		
			Located object (label)	 Ranger Station	
			Lookout tower		
			Oil and/or natural gas well		
			Other Religion (label)	 Mt. Carmel	
			School		
			Soil sample site (compiled only not published)		
			Tank (label)	 Petroleum	
			Windmill		



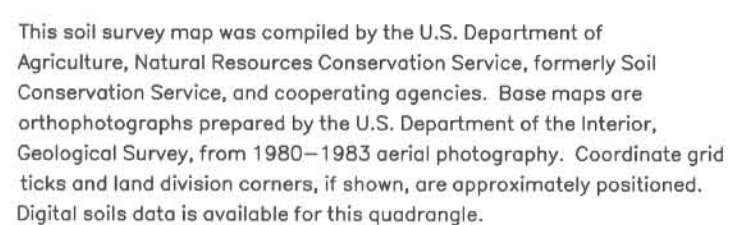
This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1980-1984 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.



Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 1

SHEET NUMBER 1 OF 22
LACLEDE COUNTY, MISSOURI
HAHATONKA QUADRANGLE

LACLEDE COUNTY, MISSOURI
DECATURVILLE QUADRANGLE
SHEET NUMBER 2
7.5 MINUTE SERIES



1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETER

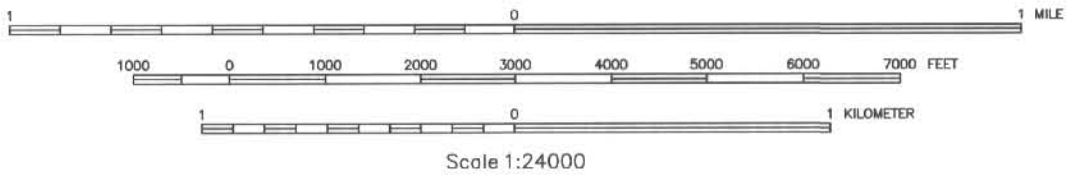
Scale 1:24000

Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 2

SHEET NUMBER 2 OF 22
LACLEDE COUNTY, MISSOURI
DECATURVILLE QUADRANGLE



(Joins sheet 5, Stoutland)



Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 3



SHEET NUMBER 3 OF 22
LACLEDE COUNTY, MISSOURI
MONTREAL QUADRANGLE

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

92°52'30"W

45°W

(Joins sheet 1, Hahatonka)



37°45'N
92°52'30"W

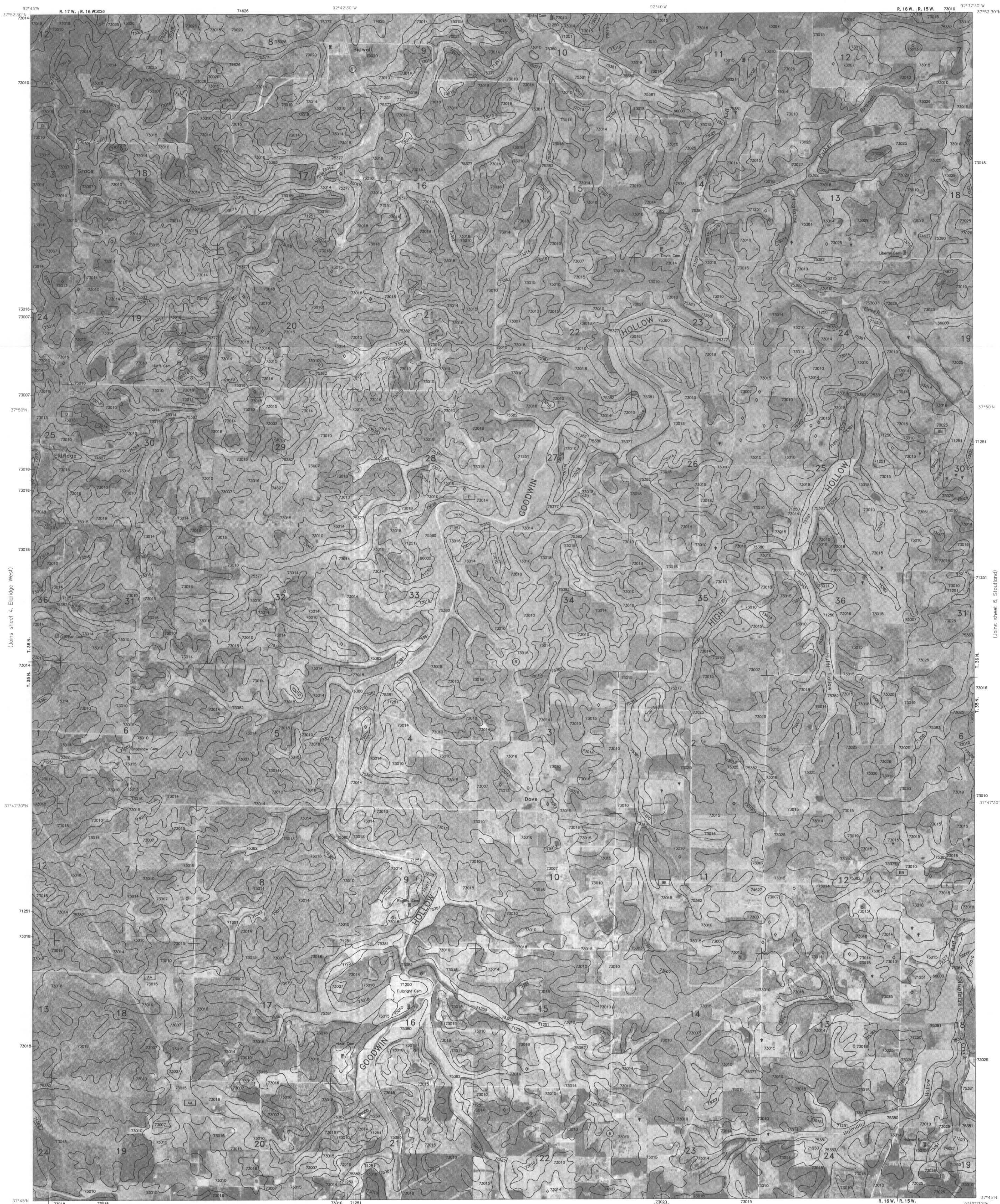


37°45'N
45°W

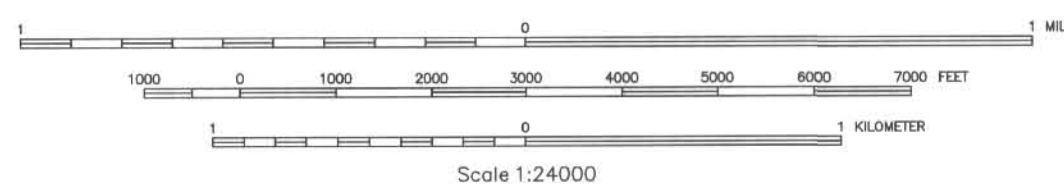
LACLEDE COUNTY, MISSOURI NO. 4

LACLEDE COUNTY, MISSOURI
ELDRIDGE EAST QUADRANGLE
SHEET NUMBER 5
7.5 MINUTE SERIES

(Joins sheet 2, Decaturville)



(Joins sheet 9, Lebanon)



This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 5

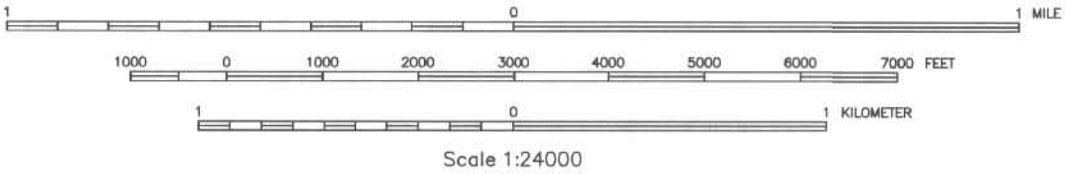
SHEET NUMBER 5 OF 22
LACLEDE COUNTY, MISSOURI
ELDRIDGE EAST QUADRANGLE

(Joins sheet 3, Montreal)



(Joins sheet 10, Oakland)

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

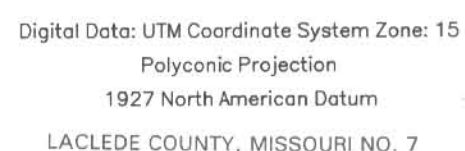
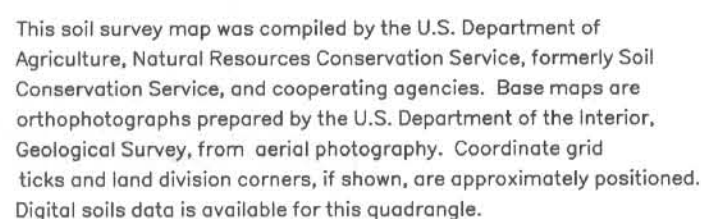


Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection

LACLEDE COUNTY, MISSOURI NO. 6

SHEET NUMBER 6 OF 22
LACLEDE COUNTY, MISSOURI
STOUTLAND QUADRANGLE

LACLEDE COUNTY, MISSOURI
RICHLAND QUADRANGLE
SHEET NUMBER 7
7.5 MINUTE SERIES

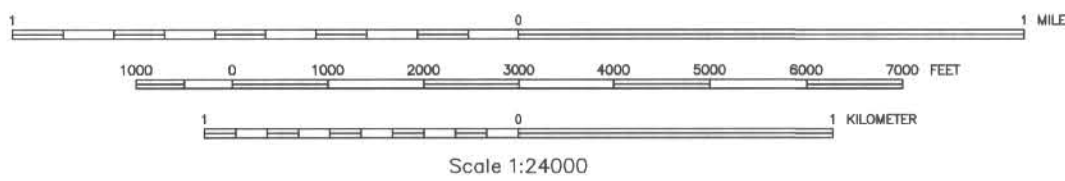


SHEET NUMBER 7 OF 22
LACLEDE COUNTY, MISSOURI
RICHLAND QUADRANGLE

(Joins sheet 4, Eldridge West)



(Joins sheet 13, Phillipsburg)

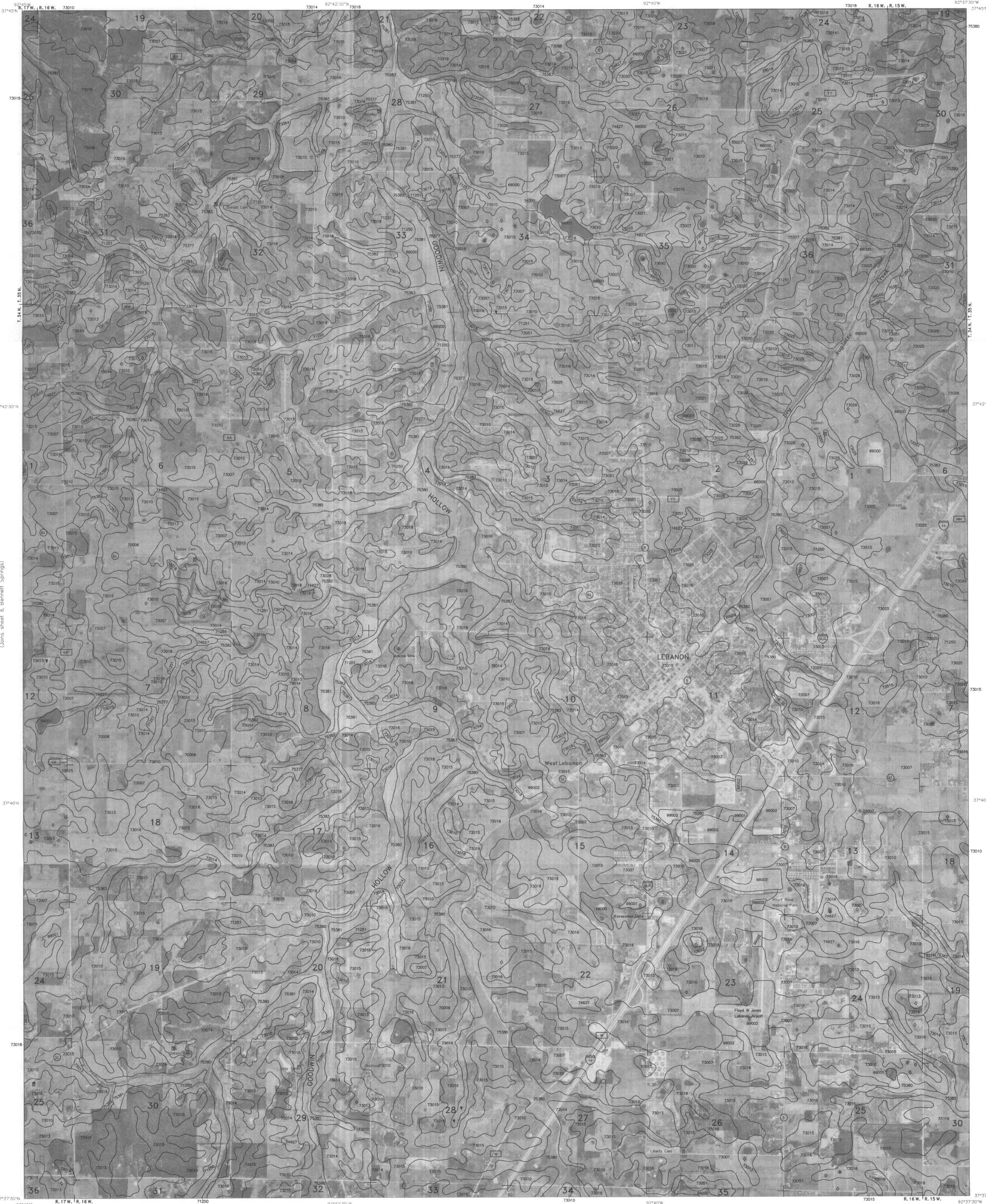


This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 8

SHEET NUMBER 8 OF 22
LACLEDE COUNTY, MISSOURI
BENNETT SPRINGS QUADRANGLE

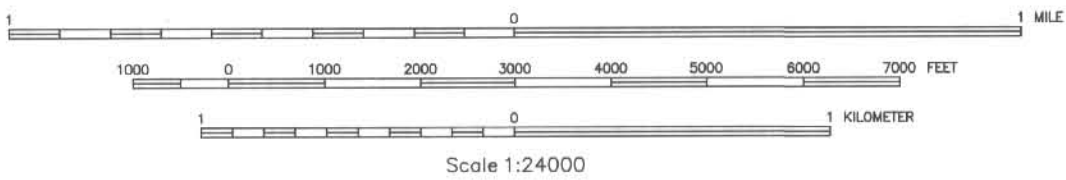
(Joins sheet 5, Eldridge East)



(Joins sheet 8, Bennett Springs)

(Joins sheet 10, Oakland)

(Joins sheet 14, Brush Creek)



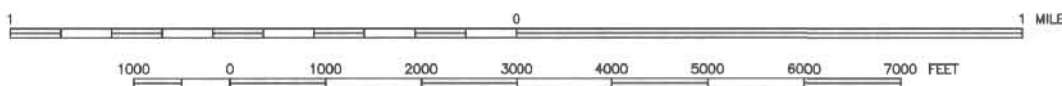
This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 9

(Joins sheet 6, Stoutland)



(Joins sheet 15, Russ)



This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 10

SHEET NUMBER 10 OF 22
LACLEDE COUNTY, MISSOURI
OAKLAND QUADRANGLE

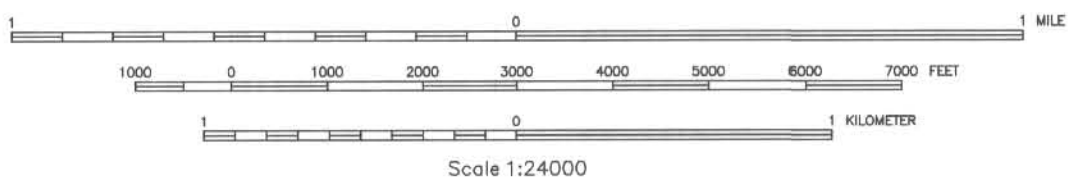
(Joins sheet 7, Richland)



(Joins sheet 10, Oakland)

(Joins sheet 12, Brownfield)

(Joins sheet 16, Drew)



Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 11

SHEET NUMBER 11 OF 22
LACLEDE COUNTY, MISSOURI
DRYNOB QUADRANGLE

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.



This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 12

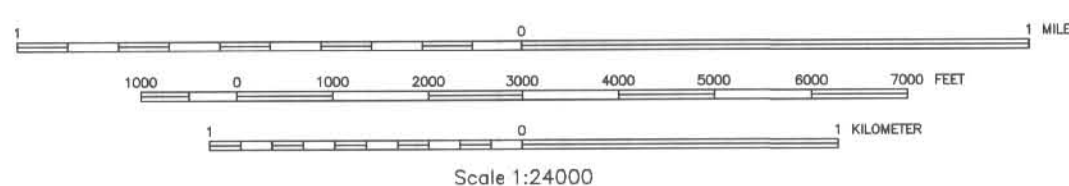
SHEET NUMBER 12 OF 22
LACLEDE COUNTY, MISSOURI
BROWNFIELD QUADRANGLE

LACLEDE COUNTY, MISSOURI
PHILLIPSBURG QUADRANGLE
SHEET NUMBER 13
7.5 MINUTE SERIES

(Joins sheet 8, Bennett Springs)



(Joins sheet 18, Niangua)



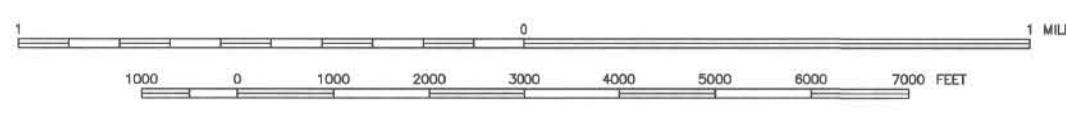
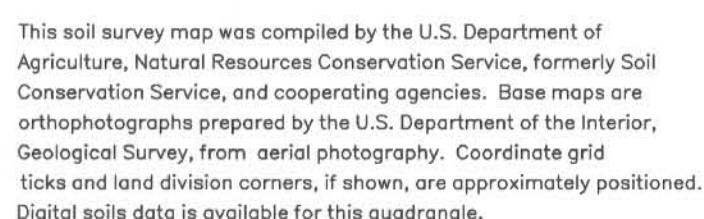
This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 13

SHEET NUMBER 13 OF 22
LACLEDE COUNTY, MISSOURI
PHILLIPSBURG QUADRANGLE

LACLEDE COUNTY, MISSOURI
BRUSH CREEK QUADRANGLE
SHEET NUMBER 14
7.5 MINUTE SERIES

(Joins sheet 9, Lebanon)



Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 14

SHEET NUMBER 14 OF 22
LACLEDE COUNTY, MISSOURI
BRUSH CREEK QUADRANGLE

A detailed topographic map of the Osage State Park area. The map features numerous contour lines indicating elevation, with labels such as 7000, 7100, 7200, 7300, 7400, 7500, 7600, 7700, 7800, 7900, 8000, 8100, 8200, 8300, 8400, 8500, 8600, 8700, 8800, 8900, 9000, 9100, 9200, 9300, 9400, 9500, 9600, 9700, 9800, 9900, 10000, 10100, 10200, 10300, 10400, 10500, 10600, 10700, 10800, 10900, 11000, 11100, 11200, 11300, 11400, 11500, 11600, 11700, 11800, 11900, 12000, 12100, 12200, 12300, 12400, 12500, 12600, 12700, 12800, 12900, 13000, 13100, 13200, 13300, 13400, 13500, 13600, 13700, 13800, 13900, 14000, 14100, 14200, 14300, 14400, 14500, 14600, 14700, 14800, 14900, 15000, 15100, 15200, 15300, 15400, 15500, 15600, 15700, 15800, 15900, 16000, 16100, 16200, 16300, 16400, 16500, 16600, 16700, 16800, 16900, 17000, 17100, 17200, 17300, 17400, 17500, 17600, 17700, 17800, 17900, 18000, 18100, 18200, 18300, 18400, 18500, 18600, 18700, 18800, 18900, 19000, 19100, 19200, 19300, 19400, 19500, 19600, 19700, 19800, 19900, 20000, 20100, 20200, 20300, 20400, 20500, 20600, 20700, 20800, 20900, 21000, 21100, 21200, 21300, 21400, 21500, 21600, 21700, 21800, 21900, 22000, 22100, 22200, 22300, 22400, 22500, 22600, 22700, 22800, 22900, 23000, 23100, 23200, 23300, 23400, 23500, 23600, 23700, 23800, 23900, 24000, 24100, 24200, 24300, 24400, 24500, 24600, 24700, 24800, 24900, 25000, 25100, 25200, 25300, 25400, 25500, 25600, 25700, 25800, 25900, 26000, 26100, 26200, 26300, 26400, 26500, 26600, 26700, 26800, 26900, 27000, 27100, 27200, 27300, 27400, 27500, 27600, 27700, 27800, 27900, 28000, 28100, 28200, 28300, 28400, 28500, 28600, 28700, 28800, 28900, 29000, 29100, 29200, 29300, 29400, 29500, 29600, 29700, 29800, 29900, 30000, 30100, 30200, 30300, 30400, 30500, 30600, 30700, 30800, 30900, 31000, 31100, 31200, 31300, 31400, 31500, 31600, 31700, 31800, 31900, 32000, 32100, 32200, 32300, 32400, 32500, 32600, 32700, 32800, 32900, 33000, 33100, 33200, 33300, 33400, 33500, 33600, 33700, 33800, 33900, 34000, 34100, 34200, 34300, 34400, 34500, 34600, 34700, 34800, 34900, 35000, 35100, 35200, 35300, 35400, 35500, 35600, 35700, 35800, 35900, 36000, 36100, 36200, 36300, 36400, 36500, 36600, 36700, 36800, 36900, 37000, 37100, 37200, 37300, 37400, 37500, 37600, 37700, 37800, 37900, 38000, 38100, 38200, 38300, 38400, 38500, 38600, 38700, 38800, 38900, 39000, 39100, 39200, 39300, 39400, 39500, 39600, 39700, 39800, 39900, 40000, 40100, 40200, 40300, 40400, 40500, 40600, 40700, 40800, 40900, 41000, 41100, 41200, 41300, 41400, 41500, 41600, 41700, 41800, 41900, 42000, 42100, 42200, 42300, 42400, 42500, 42600, 42700, 42800, 42900, 43000, 43100, 43200, 43300, 43400, 43500, 43600, 43700, 43800, 43900, 44000, 44100, 44200, 44300, 44400, 44500, 44600, 44700, 44800, 44900, 45000, 45100, 45200, 45300, 45400, 45500, 45600, 45700, 45800, 45900, 46000, 46100, 46200, 46300, 46400, 46500, 46600, 46700, 46800, 46900, 47000, 47100, 47200, 47300, 47400, 47500, 47600, 47700, 47800, 47900, 48000, 48100, 48200, 48300, 48400, 48500, 48600, 48700, 48800, 48900, 49000, 49100, 49200, 49300, 49400, 49500, 49600, 49700, 49800, 49900, 50000, 50100, 50200, 50300, 50400, 50500, 50600, 50700, 50800, 50900, 51000, 51100, 51200, 51300, 51400, 51500, 51600, 51700, 51800, 51900, 52000, 52100, 52200, 52300, 52400, 52500, 52600, 52700, 52800, 52900, 53000, 53100, 53200, 53300, 53400, 53500, 53600, 53700, 53800, 53900, 54000, 54100, 54200, 54300, 54400, 54500, 54600, 54700, 54800, 54900, 55000, 55100, 55200, 55300, 55400, 55500, 55600, 55700, 55800, 55900, 56000, 56100, 56200, 56300, 56400, 56500, 56600, 56700, 56800, 56900, 57000, 57100, 57200, 57300, 57400, 57500, 57600, 57700, 57800, 57900, 58000, 58100, 58200, 58300, 58400, 58500, 58600, 58700, 58800, 58900, 59000, 59100, 59200, 59300, 59400, 59500, 59600, 59700, 59800, 59900, 60000, 60100, 60200, 60300, 60400, 60500, 60600, 60700, 60800, 60900, 61000, 61100, 61200, 61300, 61400, 61500, 61600, 61700, 61800, 61900, 62000, 62100, 62200, 62300, 62400, 62500, 62600, 62700, 62800, 62900, 63000, 63100, 63200, 63300, 63400, 63500, 63600, 63700, 63800, 63900, 64000, 64100, 64200, 64300, 64400, 64500, 64600, 64700, 64800, 64900, 65000, 65100, 6

SHEET NUMBER 15 OF 22
LACLEDE COUNTY, MISSOURI
RUSS QUADRANGLE

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

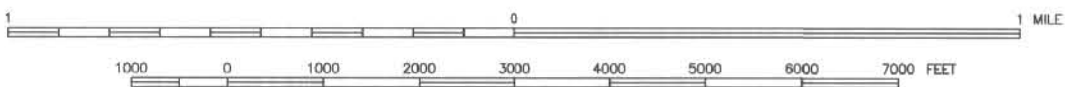
Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 15

(Joins sheet 11, Drynob)



(Joins sheet 21, Competition)

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Scale 1:24000

Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 16

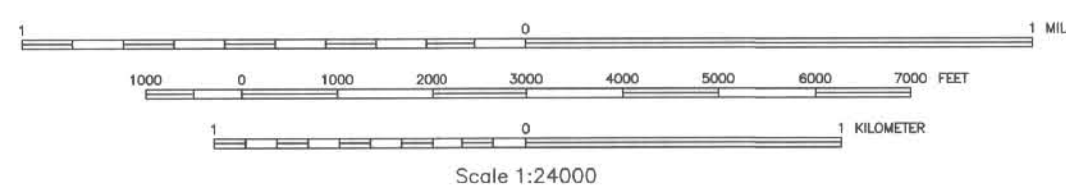
SHEET NUMBER 16 OF 22
LACLEDE COUNTY, MISSOURI
DREW QUADRANGLE

LACLEDE COUNTY, MISSOURI
WINNIPEG QUADRANGLE
SHEET NUMBER 17
7.5 MINUTE SERIES

(Joins sheet 12, Brownfield)



(Joins sheet 22, Manes)

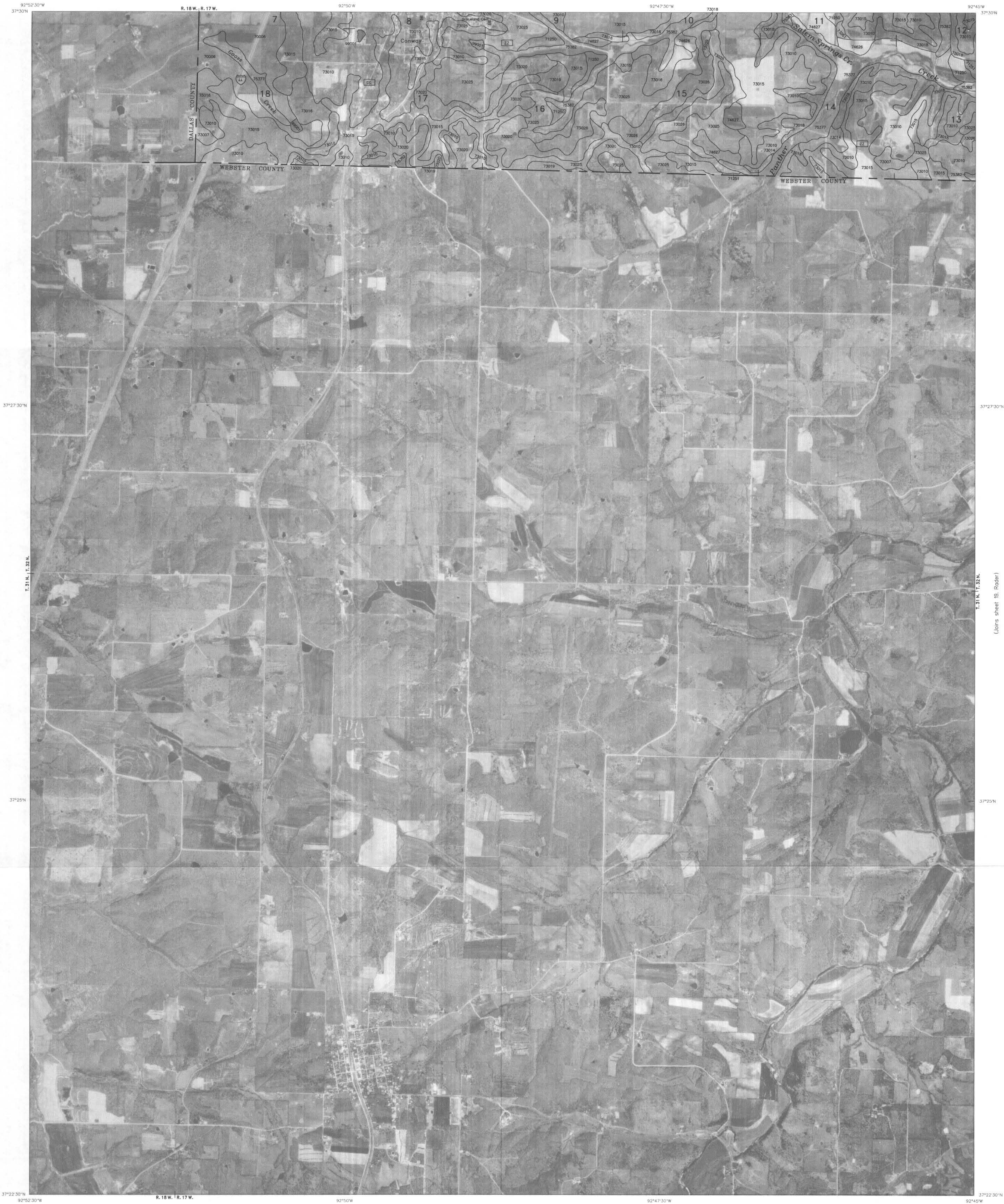


This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

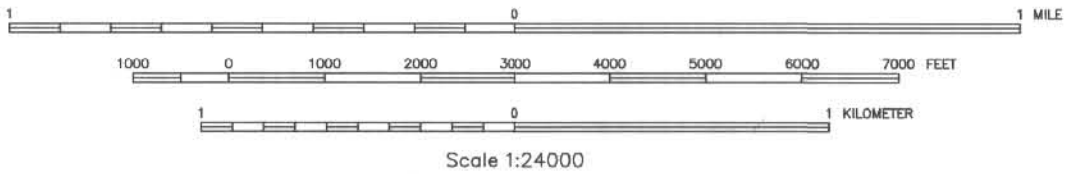
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Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 17

SHEET NUMBER 17 OF 22
LACLEDE COUNTY, MISSOURI
WINNIPEG QUADRANGLE

(Joins sheet 13, Phillipsburg)



This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

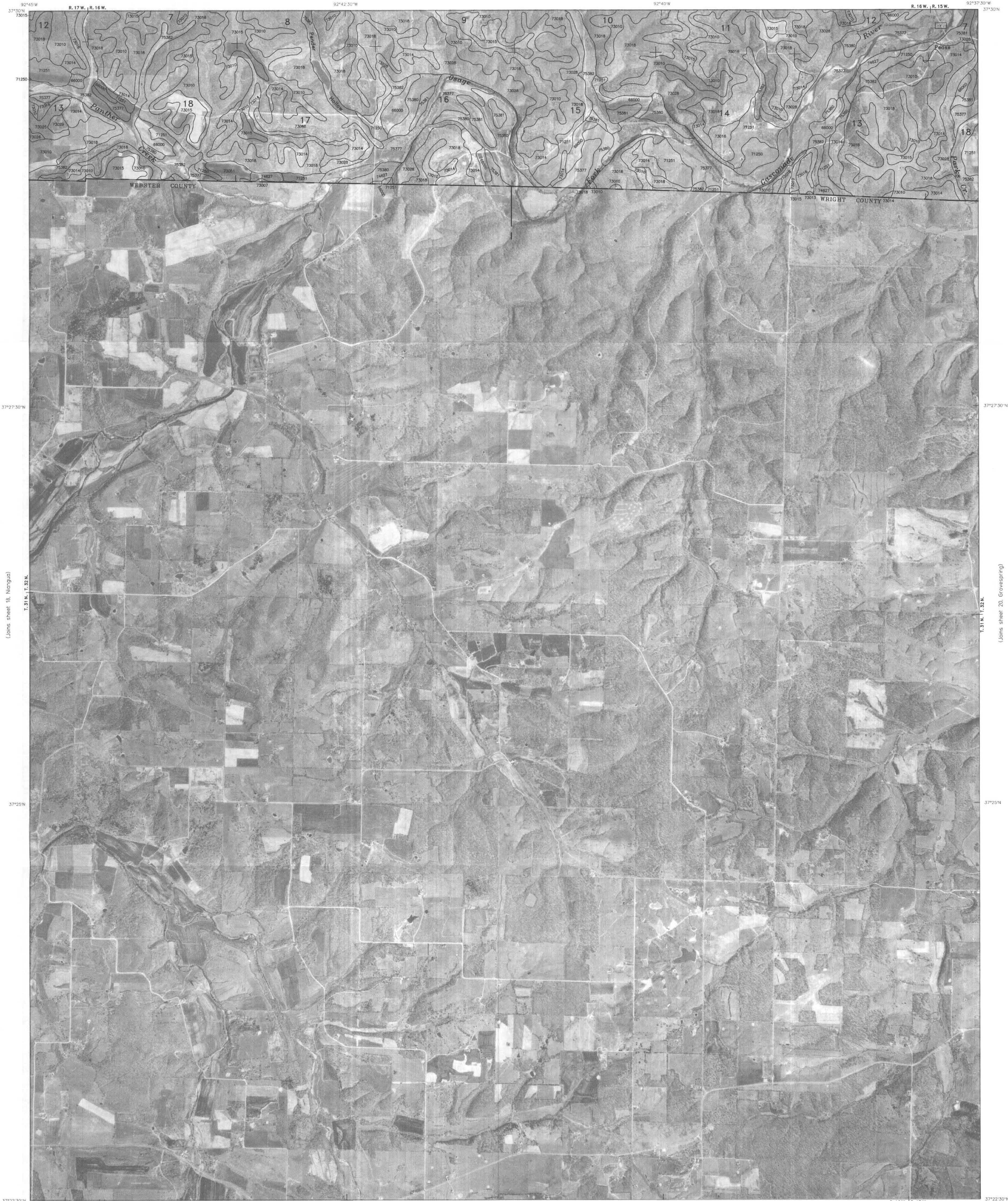


Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 18

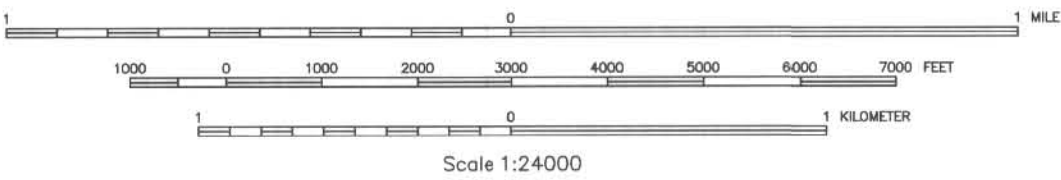


SHEET NUMBER 18 OF 22
LACLEDE COUNTY, MISSOURI
NIANGUA QUADRANGLE

(Joins sheet 14, Brush Creek)



This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

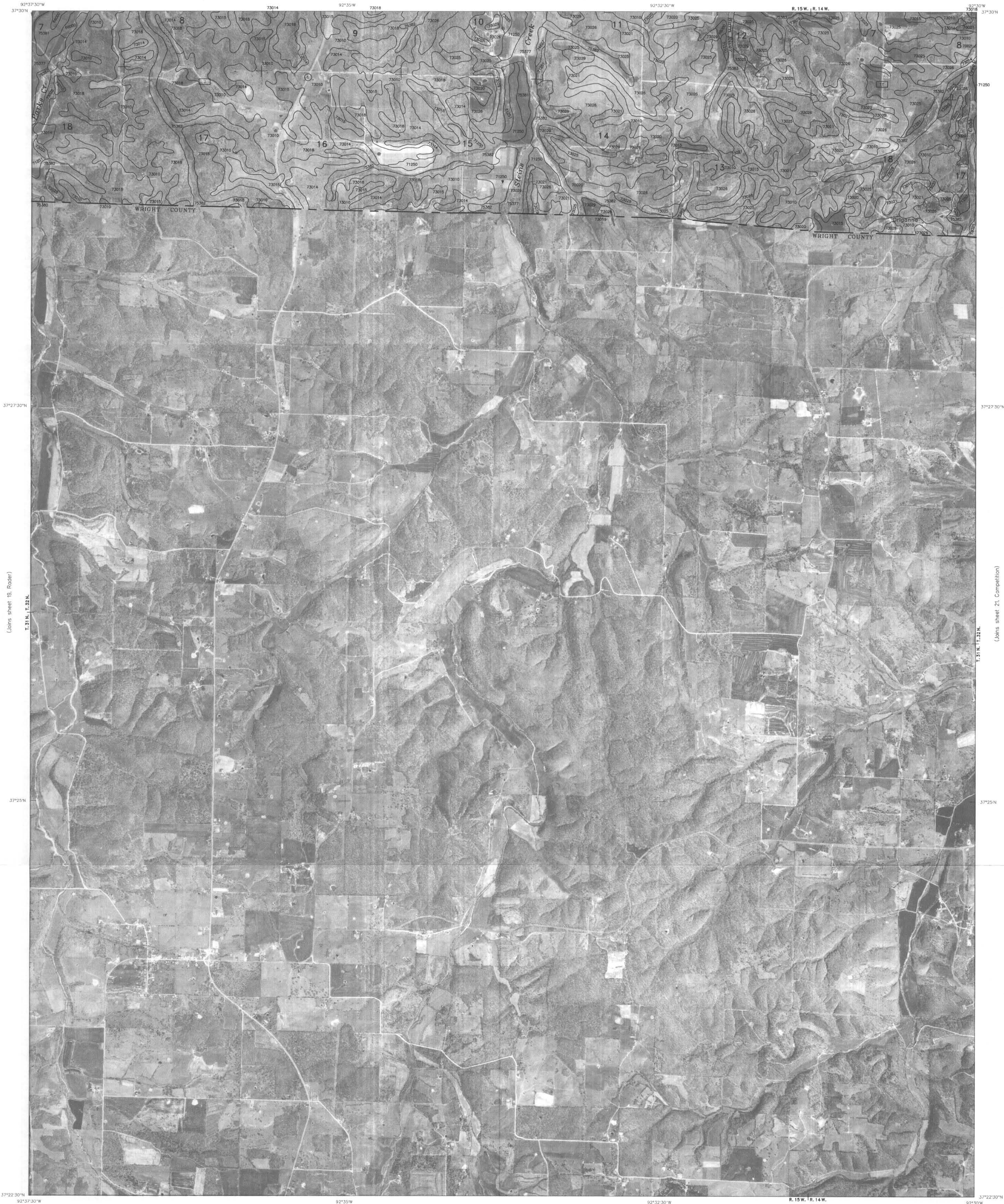


Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 19

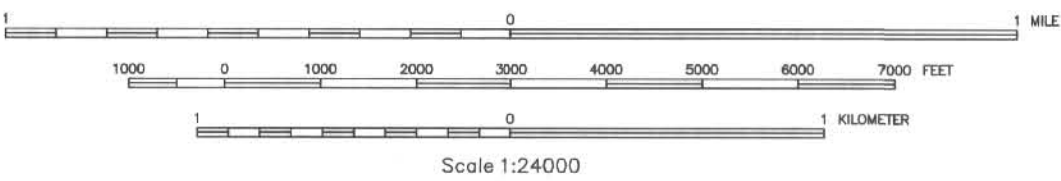


SHEET NUMBER 19 OF 22
LACLEDE COUNTY, MISSOURI
RADER QUADRANGLE

(Joins sheet 15, Russ)



This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.



Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 20

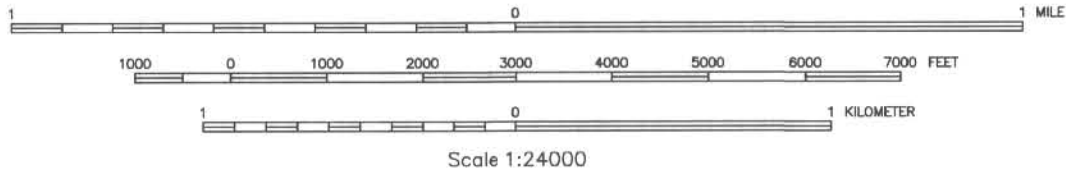


SHEET NUMBER 20 OF 22
LACLEDE COUNTY, MISSOURI
GROVESPRING QUADRANGLE

(Joins sheet 16, Drew)



This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

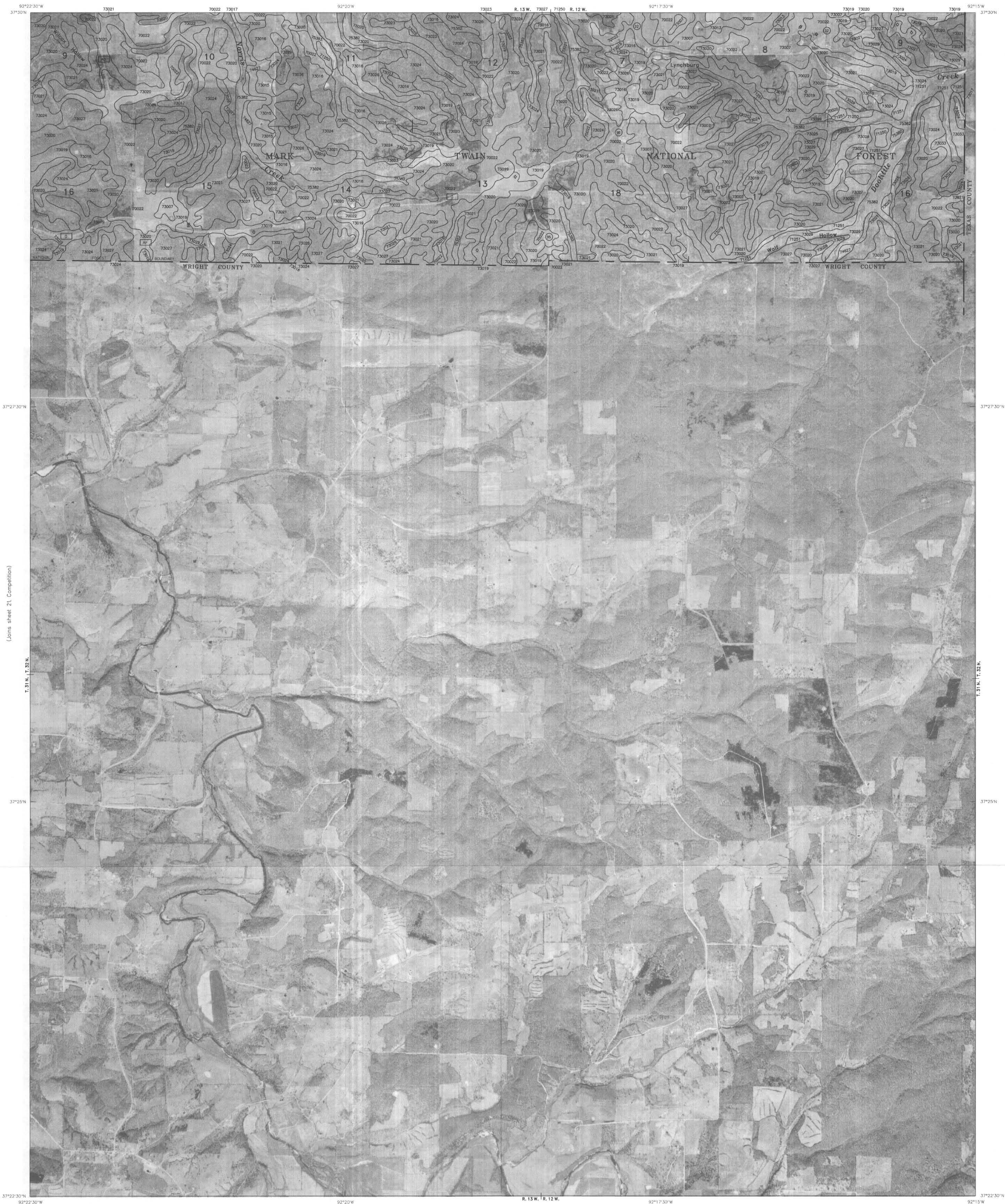


Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 21

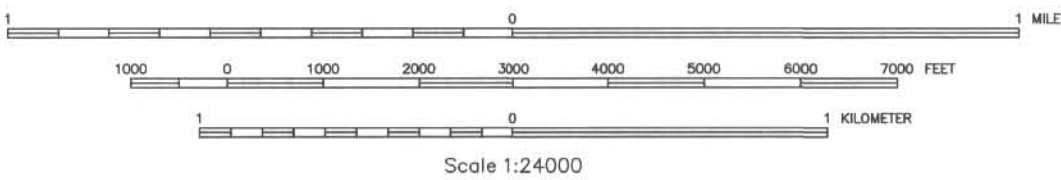


SHEET NUMBER 21 OF 22
LACLEDE COUNTY, MISSOURI
COMPETITION QUADRANGLE

(Joins sheet 17, Winnipeg)



This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.



Digital Data: UTM Coordinate System Zone: 15
Polyconic Projection
1927 North American Datum
LACLEDE COUNTY, MISSOURI NO. 22

SHEET NUMBER 22 OF 22
LACLEDE COUNTY, MISSOURI
MANES QUADRANGLE